Oregon
Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
700 NE Multnomah Street, Suite 600
Portland, OR 97232
(503) 229-5696
FAX (503) 229-6124
TTY 711

March 21, 2022

Confederated Tribes of Coos, Lower Umpqua
and Siuslaw Indians
1245 Fulton Avenue
Coos Bay, OR 97420

Dear Dr. Lwenya,

I am writing on behalf of the Oregon Department of Environmental Quality to express support for the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians for funding under the Enhanced Air Quality Monitoring for Communities grant opportunity.

Communities throughout Oregon have expressed a need for additional air monitoring to manage local air quality. Oregon continues to feel the pressure from climate change, extreme drought and longer wildfire seasons.

A number of adverse health impacts have been associated to exposure from PM2.5 and PM10. People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure.

DEQ supports the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians proposal to increase community engagement on indoor and outdoor air quality, and develop a network of air quality monitors. The ability to have data to manage local air quality is dependent on having reliable and accurate equipment.

DEQ commends the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians for their ongoing commitment to improve their air quality and reduce exposure to harmful air pollutants for their community. We support this effort and encourage EPA to fund this grant proposal for additional air monitors and the resources needed to expand their air quality efforts.

Sincerely,

Ali Mirzakhalili
Air Quality Division Administrator

NORTH BEND
SCHOOL DISTRICT 13

NORTH BEND SCHOOL DISTRICT

Hillcrest Elementary School •North Bay Elementary School
North Bend Middle School •North Bend High School • Oregon Virtual Academy

1913 MEADE STREET • NORTH BEND, OREGON 97459-3432
Phone: (541) 756-521 • Fax: (541) 756-1313
Superintendent Kevin Bogatin

March 23, 2022

Dear EPA Enhanced Air Quality Monitoring team,

As the superintendent of the North Bend School District, I am pleased to offer this letter of support for the air quality monitoring expansion project proposed by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) as part of the EPA's American Rescue Plan (ARP) Act Air Monitoring grant for Enhanced Air Quality Monitoring for Communities.

Wildfires of both increasing frequency and increasing footprint pose a significant threat to community health here in Oregon. Not only is there immediate impact to communities who are displaced when fire ravages their homes, but impacts from the presence of smoke in the air can reach other communities hundreds of miles away. Research shows that increased exposure to particulate matter from wildfire smoke poses extreme health risks to communities, particularly in children, seniors, and those with compromised respiratory systems. Additionally, air pollution is linked with more severe COVID-19 cases and increases susceptibility to respiratory infection.

The Tribe proposes to expand their existing air monitoring network using affordable particulate air monitors powered by solar energy. This ambient particulate monitoring data will be made available for free online in real-time. Having access to real-time information on air quality is critically important for communities to be able to protect themselves and neighbors from the harmful effects of particulate matter in the air. Toxins and fine particles can enter homes, therefore it is also critically important to make air purifiers and other mitigation measures accessible to vulnerable populations when particulate matter reaches dangerous levels.

The true benefit of making this investment in CTCLUSI is their connection to the people of Coos County. They have the relationships to make sure the right people get access to information and resources to keep themselves and their families safe during periods of poor air quality. We can offer assistance through community engagement, newsletters, and outreach for CTCLUSI's air monitoring project.

For these reasons, I am proud to support CTCLUSI's application and hope that you will, too.

Respectfully,

Kevin Bogatin
Superintendent

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indian

Address: 1245 Fulton Avenue

City: Coos Bay

State: OR: Oregon Zip Code: 97420-2895

B. DUNS No. 1611604450000

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

NONE

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

NONE

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

NONE

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

N/A

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

N/A

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Roselynn Lwenya	Chief Executive Officer	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

WILLAMETTE
PARTNERSHIP

March 9, 2022

Sara O'Brien, Executive Director
Willamette Partnership
1300 SE Stark St, Ste. 212
Portland, OR 97214

Dear EPA Enhanced Air Quality Monitoring team,

As the Executive Director of Willamette Partnership, I'd like to express my wholehearted support for the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians' (CTCLUSI) application to the EPA's Enhanced Air Quality Monitoring program for air quality monitoring.

At Willamette Partnership, our mission is to help people and nature thrive together. Wildfires of both increasing frequency and increasing footprint pose a significant threat to community health here in Oregon. Not only is there immediate impact to communities who are displaced when fire ravages their homes, but communities hundreds of miles away can be impacted by the presence of smoke in the air. Research shows that increased exposure to particulate matter from wildfire smoke poses extreme health risks to communities, particularly children and seniors.

Having access to real-time information on air quality is critically important for communities to be able to protect themselves and their neighbors from the harmful effects of particulate matter in the air. It's also critically important to make air purifiers and other mitigation measures accessible to vulnerable populations when particulate matter reaches dangerous levels. CTCLUSI's proposal approaches these challenges holistically, ensuring it has both the knowledge and infrastructure to keep their community safe.

The true benefit of making this investment in CTCLUSI is their connection to the place and people of Coos County. They have the relationships to make sure the right people get access to information and resources to keep themselves and their families safe during periods of poor air quality.

For these reasons, I'm proud to support CTCLUSI's application and hope that you will, too.

Sincerely,

Sara O'Brien
Executive Director
Willamette Partnership

RESUME

Dr. Roselynn Lwenya
Director, Department of Natural Resources and Culture
Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians
1245 Fulton Avenue – Coos Bay, OR 97420
Phone: (541) 888-9577
Email: [HYPERLINK "mailto:rlwenya@ctclusi.org"]

SUMMARY

Roselynn has an earned Doctorate degree in Environmental Studies obtained from School of Environmental Studies, Moi University, Kenya. She is an environmental and Community Development specialist with over 20 years experience in environmental planning natural resource protection, management, budget development and administration, policy analysis, working with minority and action oriented research. Roselynn is solutions focused, diligent self - starter seeking to contribute to program growth, administrative support, and organizational skills toward supporting your organization in optimizing performance and growth. She has calm demeanor in the face of difficulties; ability to manage multiple projects while working under pressure in fast-paced environments. She is highly versatile; adept at quickly mastering new roles and responsibilities. Has reputation for integrity and excellent work ethic.

PROFESSIONAL EXPERIENCE

January 2020 – To-Date: Culture and Natural Resources Director for Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians

Under the direct supervision of the Chief Executive Officer, Roselynn is responsible for the successful leadership and management of the Department of Culture and Natural Resources for the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI). Specifically; Roselynn is tasked with the following responsibilities:

- Supervise and oversee the daily operations of the Natural resource staff including, Biologist, Foresters, water protection specialist(s), Air specialist, Tribal Response Specialist, Restoration Manager, THPO/Cultural Resource protection specialist, Stewardship Manager.
- Develop environmental policies, procedures and program priorities consistent with Tribal values and policies established by the Tribal Council.
- Responsible for management of all environmental and cultural resource issues that affect the CTCLUSI Tribal lands including water quality issues, riparian restoration, air quality protection, solid waste management, air quality issues and cultural resources.
- Works very closely with the education department, planning department, housing department and maintenance department to protect natural resources on non-tribal lands that are important for traditional, cultural and spiritual uses and practices.
- Coordinates community outreach and education programs for Tribal community, partner agencies and relevant government departments to equip them with knowledge regarding resource protection.

- Works closely with Federal, Oregon state agencies, local governments and CTCLUSI Legal counsel on compliance with environmental laws, orders, and directives that affect the CTCLUSI natural resources on their trust and fee lands.
- Implements programs and projects funded by US EPA, BIA, US Fish and Wildlife Service, US Department of Interior BIA, National Park Service.
- Develops and manages consultant contracts and oversees work of consultants to ensure contract terms are met. Monitors work programs and schedules to ensure timely project completion, in addition to reviewing, approving invoices, and applying/managing grants.
- Prepare annual budget for the department by determining priorities among requests from reporting staff and by explaining the need to Tribal Council for resources necessary to implement programs.
- Review and offer comments as necessary on Environmental compliant documents to meet National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Forest Practice Act (FPA) and Oregon Environmental Policy Act (OEPA) to safeguard the protection of natural resources.
- Develop and implement the CTCLUSI Forestry management plan and attendant programs to improve and protect health of the tribal forests.
- Prepare technical reports; develop plans and correspondence to be presented to various entities as appropriate.
- In accordance with the tribe's policies, directly supervises employees in the Natural Resources Department which includes but is not limited to, assigning work, training new staff and reviewing the performance of such employees performing diverse activities.
- Directs the administration of department programs and evaluates the quality of services provided.

October 2016 –to January 2020: Natural Resources Director; Susanville Indian Rancheria

Under the direct supervision of the Tribal Administrator Roselynn was responsible for the successful leadership and management of the Susanville Indian Rancheria's (SIR) Natural Resources Department (NRD). This included the staff and all ongoing projects. She provided guidance and support to the environmental staff, the Tribal Historic Preservation Officer (THPO)/NAGPRA Coordinator, an 8 member Tribal Government Liaison Committee, Forestry/Fire Crew and summer youth interns. Her responsibilities and accomplishments were;

- Coordinating and implementation of multiple environmental and cultural resource programs funded by U.S. EPA; BIA, US Forest Service, US Department of Agriculture- Natural Resources Conservation, National Park Services, among others.
- Strengthening the staff capacity to implement natural resource department programs, enforce Tribal codes and ordinances that protect environmental and natural resources on all tribal properties and all other areas of interest to the tribe.
- Relationship building and enhancing active participation with local, state, federal, and Tribal agencies, regarding current and emerging environmental issues affecting SIR tribal properties.
- Reviewing environmental documents developed by Federal, State, County, and City agencies to ensure they met NEPA, California Environmental Quality Act (CEQA), and environmental law requirements for proposed projects located within the ancestral homelands of the tribes and bands of the SIR.
- Monitoring outcomes and evaluations to ensure that the Department was meeting the goals and expectations set by the SIR Tribal Business Council and the Tribal Government Liaison Committee.

- Developed various environmental plans and ordinances including but not limited to: Susanville Indian Rancheria (SIR) Integrated Solid Waste Management Plan, Non- point source pollution assessment report and management plan; discharge of pollutants in the waters of Susanville Indian Rancheria; SIR composting plan, Water Quality Assurance Project Plan (QAPP), SIR Historic Protection Treatment Plan for the Guitierez property, Cultural resources strategic plan and land use plans.
- Working with the Tribal Historic Preservation Committee and THPO to develop appropriate responses and plans for projects that impact cultural resources or areas of importance to the Tribe.
- Coordinated efforts to complete the PHASE II ESA at SIR Guitierez property.
- Proposal writing, Technical report writing and meeting all the requirements and deliverables of each grant.
- Supervised the Tribal Historic Preservation Officer (THPO) in the efforts to inventory, protect, conserve and preserve cultural resources on ancestral homelands of the SIR tribal lands; additionally, reviewing and editing all substantive documents prepared by the THPO/NAGPRA Coordinator.
- Community Outreach and Education on various natural and cultural resource programs.
- Grant Administration; administered over 20 Federal grants for the SIR totaling more than $1,000,000 annually.
- Implemented the tribal Forestry, Wildland fire program and Tribal Youth Conservation Crew.

September 2009-to-October 2016: Environmental Resources Director and Tribal Historic Preservation Officer (THPO), Buena Vista Rancheria of Me-Wuk Indians

Under the direct supervision of the Tribal Council Roselynn was responsible for the successful leadership and management of the Buena Vista Rancheria (BVR) Environmental Department. This included the staff and all ongoing projects. She provided guidance and support to the environmental staff, the Tribal Cultural Committee, NAGPRA Coordinator and Cultural Monitors. Her responsibilities and accomplishments included:

- Coordinating and implementation of multiple programs including; U.S. EPA-General Assistance Program (GAP) and U.S EPA- Clean Water Act (CWA) Section 106 program; Department of Energy-Energy Efficiency Conservation Block Grant- American Recovery and Reinvestment Act (ARRA); Tribal Historic Preservation Office work assisted by a grant from the National Park Service, Army Corps of Engineers, Caltrans and Integrated Resource Management Plan grant from Bureau of Indian Affairs.
- Established the Buena Vista Rancheria Tribal Historic Preservation Office and became the BVR Tribal Historic Preservation Officer.
- Coordinated numerous cultural monitor trainings and community outreach and education events. Organized successful Phase I and Phase II and III of Tribal Cultural Monitors Trainings that involved over 20 tribes from California and Nevada.
- Reviewing NEPA and CEQA documents to identify resource or areas that may be impacted by the project. Additionally, reviewing and editing all substantive documents prepared by the NAGPRA Coordinator and Tribal Cultural s committee.
- Reviewed numerous technical reports prepared in compliance with state and federal laws.
- Implemented the NAGPRA program.
- Served on the California State Water Plan Tribal Advisory Committee

- Served as a representative on the U.S EPA Region IX Regional Tribal Operations Committee for a two -year term starting in October 2013 to October 2015.
- Developed the Buena Vista Water Quality Assurance Program Plan in partnership with Bureau of Reclamation.
- Coordinated and managed the assignment of Tribal Monitors to projects that impact cultural resources or areas of importance to the Tribe.
- Coordinated visits to numerous archaeological sites and consultation meetings with the Tribal Cultural Committee.
- Revised the Historic Protection Treatment Plan and ensured Tribal compliance with all applicable environmental laws and regulations to protect cultural resources and environmental resources on the reservation.
- Developed the Buena Vista Rancheria Native American Human Remains and associated Human remains Treatment Implementation Plan.
- Developed the Buena Vista Rancheria Archeological Discovery Implementation Plan
- Developed the Buena Vista Rancheria cultural Resources Monitoring tools (forms)

December 2007- to 2009: Environmental Director, North Fork Rancheria

Under the direct supervision of the Tribal Administrator Roselynn was responsible for the successful leadership and management of the North Fork Rancheria Environmental Department. This included the staff and all ongoing projects. She provided guidance and support to the environmental staff, the Environmental Committee and Cultural Monitors. Her responsibilities and accomplishments included:

- Implementing General Assistance Programs (GAP) funded by Environmental Protection Agency and other programs funded by Bureau of Indian Affairs, Stewardship Council, USDA Natural Resources Conservation Services and Tribal Council among others.
- Coordinated consultation with Federal, state, and local agencies.
- Coordinated cultural monitoring training and community outreach and education events.

March 2006 – December 2007: Natural Resources Director, Tule River Indian Reservation, Porterville, California

Under the direct supervision of the Tribal Administrator Roselynn was responsible for the successful leadership and management of the Tule River Indian Reservation Natural Resources Department. This included the staff and all ongoing projects. She provided guidance and support to the environmental staff, the Forestry/Range management crew and Tribes consultant Forester. Her responsibilities and accomplishments included:

- Management and implementation of multiple programs and projects including: the Forestry, Range management, Agriculture and Fish and Wildlife programs.
- Established good networking relationship with multiple Federal, State, County, Tribal and City agencies while working for Tule Indian Reservation, including: USDA/NRCS, USDA, Forest Service, BIA, US EPA, Army Corps of Engineers, BLM and Caltrans, among others.
- Grants writing and administration of grant funds.
- Responsible for the daily operations and functions of the Natural Resources Department and implementation of projects.

- Led and managed multidisciplinary team to support and improve Natural Resources Protection efforts while supervising a 30 member crew.
- Secured up to $ 1,100,000 in one and half years for Tule River Indian Reservation.
- Coordinated Invasive weeds Research initiatives between UC Cooperative Extension Services and Tule River Tribal Council.
- Hosted a successful field day for Tribal Conservation districts at Tule River Indian Reservation involving several key stakeholders.
- Coordinated successful Horse Round up project to meet the goal of sustainable tribal rangeland.

EDUCATION AND TRAINING

Ph. D: Environmental Studies (2002), Moi University, School of Environmental Studies, Kenya
M. Phil: Environmental Studies (1993), Moi University, School of Environmental Studies, Kenya
B.A (Hons): Anthropology and Sociology (1984), University of Nairobi, Kenya

REFERENCES: Upon Request

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-CTCLUSI ARP Grant Project Narrative.docx

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1235-Quality Assurance Statement.docx

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: | First Name: Lee Ann | Middle Name:
Last Name: Wander | Suffix:
Title: Chief Executive Officer

Complete Address:

Street1: 1245 Fulton Avenue
Street2:
City: Coos Bay | State: OR: Oregon
Zip / Postal Code: 97420-2895 | Country: USA: UNITED STATES
Phone Number: 541-888-7527 | **Fax Number:**
E-mail Address: lwander@ctclusi.org

Payee: *Individual authorized to accept payments.*

Name: Prefix: | First Name: Bonnie | Middle Name:
Last Name: Foroudi | Suffix:
Title: Chief Financial Officer

Complete Address:

Street1: 1245 Fulton Avenue
Street2:
City: Coos Bay | State: OR: Oregon
Zip / Postal Code: 97420-2895 | Country: USA: UNITED STATES
Phone Number: 541-888-7503 | **Fax Number:**
E-mail Address: bforoudi@ctclusi.org

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: | First Name: Bonnie | Middle Name:
Last Name: Foroudi | Suffix:
Title: Chief Finance Officer

Complete Address:

Street1: 1245 Fulton Avenue
Street2:
City: Coos Bay | State: OR: Oregon
Zip / Postal Code: 97420-2895 | Country: USA: UNITED STATES
Phone Number: 541-888-7503 | **Fax Number:**
E-mail Address: bforoudi@ctclusi.org

EPA Form 5700-54 (Rev 4-02)

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: **Prefix:** | **First Name:** Roselynn | **Middle Name:**

Last Name: Lwenya | **Suffix:** Ph.D.

Title: Director of Culture and Natural Resources

Complete Address:

Street1: 1245 Fulton Avenue

Street2:

City: Coos Bay | **State:** OR: Oregon

Zip / Postal Code: 97420-2895 | **Country:** USA: UNITED STATES

Phone Number: 5414357151 | **Fax Number:**

E-mail Address: rlwenya@ctclusi.org

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Enhanced Air Quality Monitoring for Communities	66.034	$	$	$ 500,000.00	$ 0.00	$ 500,000.00
2.						
3.						
4.						
5. Totals		$	$	$ 500,000.00	$ 0.00	$ 500,000.00

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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1) Enhanced Air Quality Monitoring for Communities	(2)	(3)	(4)	Total (5)
a. Personnel	$ 174,890.00	$	$	$	$ 174,890.00
b. Fringe Benefits	67,208.00				67,208.00
c. Travel	6,000.00				6,000.00
d. Equipment	60,000.00				60,000.00
e. Supplies	40,210.00				40,210.00
f. Contractual	40,000.00				40,000.00
g. Construction	0.00				0.00
h. Other	0.00				0.00
i. Total Direct Charges (sum of 6a-6h)	388,308.00				$ 388,308.00
j. Indirect Charges	111,692.00				$ 111,692.00
k. TOTALS (sum of 6i and 6j)	$ 500,000.00	$	$	$	$ 500,000.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Enhanced Air Quality Monitoring for Communities	$ 0.00	$ 0.00	$ 0.00	$ 0.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$ 0.00	$ 0.00	$ 0.00	$ 0.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$	$	$	$	$
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$	$	$	$	$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Enhanced Air Quality Monitoring for Communities	$	$	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: $388,308

22. Indirect Charges: $111,692

23. Remarks: The Tribe has a negotiated indirect rate of 30% which applies to all budget items except equipment.

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier: Oregon

8. APPLICANT INFORMATION:

* a. Legal Name: Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians

* b. Employer/Taxpayer Identification Number (EIN/TIN): 93-0903782

* c. Organizational DUNS: 1611604450000

d. Address:

* Street1: 1245 Fulton Avenue
Street2:
* City: Coos Bay
County/Parish: Choose State...
* State: OR: Oregon
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 97420-2895

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Roselynn
Middle Name:
* Last Name: Lwenya,
Suffix: Ph.D.

Title: Natural Resources Director

Organizational Affiliation:
Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians

* Telephone Number: 541-435-7151
Fax Number:

* Email: rlwenya@ctclusi.org

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

I: Indian/Native American Tribal Government (Federally Recognized)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians Enhanced Air Monitoring for Communities

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: OR-004 * b. Program/Project: OR-004

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2022 * b. End Date: 09/30/2025

18. Estimated Funding ($):

* a. Federal	500,000.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	500,000.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name: Lee Ann

Middle Name:

* Last Name: Wander

Suffix:

* Title: Chief Executive Officer

* Telephone Number: 541-888-7527 Fax Number:

* Email: lwander@ctclusi.org

* Signature of Authorized Representative: Roselynn Lwenya * Date Signed: 03/25/2022

LRAPA
Lane Regional Air Protection Agency

1010 Main St
Springfield, OR 97477

Phone (541) 736-1056
Fax (541) 726-1205
1-877-285-7272
http://www.lrapa.org
E-mail: lrapa@lrapa.org

March 14, 2022

Debbie Bossley
Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians
1245 Fulton Avenue
Coos Bay, OR 97420

Dear Chair Bossley,

I am pleased to offer this letter of support for the air quality monitoring expansion project proposed by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians as part of the EPA's ARP Enhanced Air Quality Monitoring for Communities RFA. The Tribe proposes to expand their existing air monitoring network using affordable particulate air monitors powered by solar energy. This ambient particulate monitoring data will be made available for free online in near real-time. This will help protect both Tribal members and the community as a whole and will be especially useful for addressing wildfire smoke hazards and smoke from heating fires.

Air pollution is linked with more severe COVID-19 cases and increases susceptibility to respiratory infection and illness in general. Therefore, ambient air monitoring of particulates is one of many potential ways to help alleviate the disproportionate impact the COVID-19 pandemic is having on Tribal communities. Additionally, we appreciate CTCLUSI's efforts to address indoor air pollution by providing Tribal members with air filtration systems and updated carbon monoxide detectors. Improving indoor air quality is a way to directly improve and protect the health of vulnerable community members and goes hand-in-hand with the expanded ambient air monitoring network CTCLUSI seeks to deploy.

LRAPA will also be available to offer advice and assistance on the design and placement of the expanded air monitoring network to help the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians reach their desired goals and outcomes.

Respectfully,

Steven A. Dietrich

Steven A. Dietrich
Executive Director

City of Coos Bay

Office of the Mayor

500 Central Avenue, Coos Bay, Oregon 97420
Phone 541- 269-8912 • Fax 541- 267-5912
http:/www.coosbay.org

March 18, 2022

Dear EPA Enhanced Air Quality Monitoring team,

As the Mayor of Coos Bay, I am pleased to offer this letter of support for the air quality monitoring expansion project proposed by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) as part of the EPA's American Rescue Plan (ARP) Act Air Monitoring grant for Enhanced Air Quality Monitoring for Communities.

Wildfires of both increasing frequency and increasing footprint pose a significant threat to community health here in Oregon. Not only is there immediate impact to communities who are displaced when fire ravages their homes, but impacts from the presence of smoke in the air can reach other communities hundreds of miles away. Research shows that increased exposure to particulate matter from wildfire smoke poses extreme health risks to communities, particularly in children, seniors, and those with compromised respiratory systems. Additionally, air pollution is linked with more severe COVID-19 cases and increases susceptibility to respiratory infection.

The Tribe proposes to expand their existing air monitoring network using affordable particulate air monitors powered by solar energy. This ambient particulate monitoring data will be made available for free online in real-time. Having access to real-time information on air quality is critically important for communities to be able to protect themselves and neighbors from the harmful effects of particulate matter in the air. Toxins and fine particles can enter homes, therefore it is also critically important to make air purifiers and other mitigation measures accessible to vulnerable populations when particulate matter reaches dangerous levels.

The true benefit of making this investment in CTCLUSI is their connection to the people of Coos County. They have the relationships to make sure the right people get access to information and resources to keep themselves and their families safe during periods of poor air quality. For these reasons, I am proud to support CTCLUSI's application and hope that you will, too.

Respectfully,

Joe Benetti, Mayor
City of Coos Bay

CONFEDERATED TRIBES OF
COOS, LOWER UMPQUA AND SIUSLAW INDIANS
TRIBAL GOVERNMENT
1245 Fulton Avenue - Coos Bay, OR 97420
Telephone: (541)888-9577 Toll Free 1-888-280-0726 Fax: (541)888-2853

RESOLUTION NO: 22 - 037
Date of Passage: March 13, 2022
Subject (title): EPA Enhanced Air Quality Monitoring for Communities Grant Application

WHEREAS: Under Article VI, Section 2 of the Constitution of the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians of Oregon ("Constitution"), the Tribal Council is authorized to exercise all legislative and executive authority of the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians ("Tribe" or "CTCLUSI"); and

WHEREAS: Under Article VI, Section 4 of the Constitution, all final decisions of Tribal Council shall be embodied in ordinances or resolutions; and

WHEREAS: Based on research from the 2021 wildfire season, the Centers for Disease Control and Prevention ("CDC") has linked wildfire smoke to increased susceptibility to respiratory infections, including COVID-19; and

WHEREAS: Climate scientists predict that wildfires in our area will continue to get larger with more intensity and that wildfire season will grow longer, as a result of decreasing precipitation and increasing temperature; and

WHEREAS: The Environmental Protection Agency ("EPA") has established a grant program, the Enhanced Air Quality Monitoring for Communities, that provides funding to monitor air pollution; and

WHEREAS: The Department of Cultural and Natural Resources has developed a grant application for EPA Enhanced Air Quality Monitoring for Communities funds from the EPA in the amount not to exceed $500,000 to monitor air pollutants in the communities within the Tribe's five service areas: Coos, Curry, Douglas, Lane, and Lincoln Counties.

THEREFORE, BE IT RESOLVED, The Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians Tribal Council approves the submission and requests full funding consideration of the EPA Enhanced Air Quality Monitoring for Communities grant application for a grant not exceed $500,000 and authorizes the Chair or her designee to sign all required documents contemplated by the grant application.

CONFEDERATED TRIBES OF
COOS, LOWER UMPQUA AND SIUSLAW INDIANS
TRIBAL GOVERNMENT
1245 Fulton Avenue - Coos Bay, OR 97420
Telephone: (541)888-9577 Toll Free 1-888-280-0726 Fax: (541)888-2853

RESOLUTION NO: 22 - 037
Date of Passage: March 13, 2022
Subject (title): EPA Enhanced Air Quality Monitoring for Communities Grant Application

CERTIFICATION: On March 13, 2022 this Resolution was approved at a Tribal Council Meeting held this date, and the vote was:

7 FOR
0 AGAINST
0 ABSTAIN

Debbie Bossley, Chair

Julie Siestreem, Vice-Chair

CONFEDERATED TRIBES OF COOS,
LOWER UMPQUA & SIUSLAW INDIANS

Councilperson

RESUME

Air Protection Specialist: Ali Grove, Phone: (541)-435-7156; [HYPERLINK "mailto:agrove@ctclusi.org"]

Ali Grove is the Tribe's Air Protection Specialist. She is the newest addition to the CTCLUSI Air Quality Program (AQP), starting in February 2022. The Air Protection Specialist is responsible for performing environmental analysis and environmental monitoring associated with the Tribal AQP, which monitors air quality and meteorological parameters primarily of Tribal reservation and trust lands. Additionally, the Air Protection Specialist performs data collection, data management and analysis, instrument calibrations and maintenance of the current air monitoring station with an aim to protect tribal member health and resources from ambient and indoor air pollution.

Ali is a Karuk Tribal member (just south of the CTCLUSI in Northern California) and graduated from Portland State University in 2019 with a BS in Environmental Science and Management, and a Minor in Sustainability. She has experience researching ambient environmental toxin deposition on ecoroofs and their impacts on indoor air quality. She is currently working on completing the online air quality certificate program and training provided by the ITEP at NAU. Ali has been participating in the NW EPA-Tribal Air Quality monthly calls and will be attending the 2022 Smoke Management in the Northwest Conference to keep up to date on policies and resources related to wildfire and smoke management in the Pacific Northwest.

Job Title:	**Air Monitoring Project Manager**
Job Code:	
Department:	Natural Resources
Reports to:	Director of Natural Resources
FLSA:	
Starting Salary:	**$30/hour**
Salary Grade:	

Air Monitoring Project Manager

SUMMARY

The Air Monitoring Project Manager is responsible for managing the Tribes' Community Air Monitoring Network which monitors ambient and indoor air quality primarily of Tribal reservation and trust lands. Duties include data collection, data management and analysis, instrument calibrations and maintenance, quality assurance and quality control. This position will provide data management services and support for the Tribal Air Quality Program. Additionally, this position will aim to protect Tribal member health and resources from ambient and indoor air pollution.

PRINCIPAL ACTIVITIES & RESPONSIBILITIES

- Install, operate, and maintain monitoring equipment for each monitoring station in the Community Air Monitoring Network.
- Collect, manage, analyze, and report air quality data.
- Review and update the Air Quality Program Plan, Air Quality Assurance Project Plans, Air Quality Outreach materials and other EPA monitoring strategy documents.
- Produce outreach materials and activities for Tribal members regarding issues and exposures related to ambient (especially pertaining to wildfire smoke) and indoor air quality, and prohibitive burning.
- Assist in developing air quality curriculum for schools, educating students, and working with school staff on air monitoring projects.
- Complete daily, quarterly, and annual reports in specified formats.
- Organization and archiving of physical and digital files.
- Maintain appearance standards as outlined in CTCLUSI policies.
- Must interact with Tribal members and the general public in a courteous, professional, and efficient manner.
- Communicate effectively both verbally and in writing.
- Maintain a good attendance record as outlined in CTCLUSI Handbook.
- Other duties as directed by management.

LEVEL OF AUTHORITY & RESTRICTIONS

- No supervisory authority

- Work is performed under the general direction of the Culture and Natural Resource Director, Chief Executive Officer and/or Tribal Council.
- Incumbent must display a high degree of initiative in carrying out their duties.

WORKING CONDITIONS & ENVIRONMENT

- Work effectively in a team environment with a diverse variety of technical, professional, and administrative staff.
- Work effectively in a negotiating environment where others may have diverse and competing interests and may be uncooperative or adversarial.
- The noise level in the office environment is usually moderately quiet.
- May require the ability to walk, hike, swim, drive, and boat in difficult conditions at various hours and days of the week.
- Requires occasionally irregular working schedules around project events, evening and weekend meetings, out-of-area travel for meetings, conferences, workshops, trainings, etc.
- May be subject to extreme weather conditions, noisy conditions (shouting necessary to communicate), reduced air quality (may encounter fumes, odors, dust, chemicals (e.g. Herbicides), encounters with wild animals and insects.
- Will occasionally be in close proximity to large machinery (bulldozers, excavators, yarders, and loaders).
- Will require occasional field work in remote forested locations.
- Requires occasionally irregular working schedules around tides, other cycles or events, evening and weekend meetings, out-of-area travel for meetings, conferences, workshops, trainings, etc.

PHYSICAL & MENTAL DEMANDS

- Requires the ability to maintain high level of professionalism in all interactions.
- Requires the ability to communicate effectively with federal, state, county, and local governments, and the ability to work well with Tribal members, the general public, private landowners, and stakeholder organizations.
- Requires the ability to manage moderate levels of stress arising from schedules, workload, diverse or adversarial stakeholders, etc.
- Must be able to walk, talk, hear, use hands to handle, feel or operate objects, tools, or controls, and reach with hands and arms.
- Must be required to push, pull, lift, and/or carry up to 50 pounds.
- The physical ability to stand, sit crouch, stoop, bend knees and rest on knees or walk frequently, to use both hands for dexterity and grasping, ability to traverse steep slopes and difficult ground conditions for extended periods of time, to drive vehicles with either standard or automatic transmissions for up to 6 hours or more per day.
- The physical ability to work outdoors in all temperatures and weather conditions. The physical ability to work around loud and constant noise continuously, to tolerate required personal protective equipment such as safety/fire boots, work gloves, safety glasses, ear protection, safety vests, face shields and hard hats.
- Requires the ability to maintain high level of professionalism in all interactions.
- May require the ability to walk, hike, and, drive in difficult conditions at various hours and days of the week

MINIMUM JOB REQUIREMENTS

- Must be at least 25 years of age per Tribal Vehicle Use Policy.
- Bachelor's Degree in Environmental Science, Environmental Studies, General Science, or related field, or two years' experience in the collection, management, and reporting of environmental data. Equivalent combination of education and direct, relevant, and progressive experience may be accepted in lieu of educational requirement.
- Proficiency with Microsoft products (Access, Excel, Outlook, PowerPoint, Word), ArcGIS, SQL (Structured Query Language), and R and RStudio, or the ability to gain proficiency within 180 days of reporting to work.
- Working knowledge of experimental design and statistical analysis
- Working knowledge of the Clean Air Act.
- Working knowledge of chemistry, processes, functions, and health effects pertaining to air quality.
- Working knowledge of Treatment in the Same Manner as a State (TAS), which permits several federal environmental laws to be implemented and managed by Tribal environmental programs.
- Working knowledge of grant management with requirements of grant work plans and budgets, or ability to gain within 180 days of reporting to work.
- Ability to learn how to calibrate air particulate and meteorological equipment.
- Excellent problem solving, time management and verbal/written communication skills including ability to communicate effectively with federal, state, county, local governments, Tribal members, the general public, private land owners, external and internal stakeholders.
- Must possess reasonable ability to communicate in English.
- Must possess a valid driver's license as well as the ability to be able to comply with Tribal Vehicle Use Policy. This position may include providing transportation for Native and non-Native American clients in tribally owned vehicles.
- For Covered Positions use this bullet - This is a covered position and will be subject to pre-employment drug testing and criminal history background check, which will include fingerprinting.
- Must have employment eligibility in the U.S.
- Indian preference will be observed in the hiring process.

PREFERRED QUALIFICATIONS

- Experience with the use of SQL (Structured Query Language), and R and RStudio or other statistical data management programs.
- Experience conducting ambient air monitoring.
- Knowledge of EPA established National Ambient Air Quality Standards (NAAQS) for pollutants of greatest concern.

ACKNOWLEDGEMENT

I hereby acknowledge that I have read and reviewed this Job Description with my Supervisor. I also acknowledge that I have full and complete understanding of this Job Description and agree to the above noted Duties, Responsibilities, Requirements and Conditions.

_____ _____ _____

Employee Name	Signature	Date
_____	_____	_____
Supervisor Name	Signature	Date

Original to HR
Copy to Employee
Copy to Supervisor

Quality Assurance Statement

CTCLUSI will update our current Quality Assurance Project Plan to cover data collection, processing, and management practices for this project. The current QAPP covers a nephelometer and associated meteorological station sited at the CTCLUSI's main offices, and has been reviewed and approved by EPA Region 10. The QAPP is presently being updated to include the BAM 1022, and will be further updated should this project be funded to cover the low-cost monitoring network. The updated QAPP will also be submitted to EPA for review and approval.

Quality assurance management and oversight:

Director of the Department of Culture and Natural Resources (Dr. Roselynn Lwenya), who manages and oversees the development and successful operation of the AQP, prepares and reviews budgets, contracts, grants and proposals, and oversees the implementation of projects. This position is partially funded through Section 105 of the Clean Air Act. The Director of Culture and Natural Resources is ultimately responsible for ensuring that program staff receives adequate instruction, training, and certification to carry out their responsibilities under this Quality Assurance Project Plan. It is the responsibility of each staff member to present the Director with a plan outlining a schedule for taking the necessary coursework to satisfy the training and certification requirements.

The Air Quality Protection Specialist (Ali Grove) is responsible for uploading data to the EPA's Air Quality System (AQS), and is receiving training from the EPA on accessing and uploading to the AQS system. In addition to AQS training, the core training for air program staff comes from classes provided by the Institute for Tribal Environmental Professionals (ITEP). At minimum, the Air Quality Protection Specialist must complete the Air Pollution Technology (Level 2) course, which requires as a pre-requisite the courses of Introduction to Tribal Air Quality (Level 1) and Air Quality Computations (Level 1). If these courses are unavailable, the Director and Air Protection Specialist will work together to find a suitable alternative arrangement.

Air and Water Protection Specialist (Carter Thomas), will be responsible for collecting, verifying, and reporting on air quality and meteorological data collected in accordance with an EPA approved QAPP and SOPs. Staff in this position installs, operates, and maintains monitoring equipment and the monitoring site, and participates in trainings that increase air quality monitoring skills. In addition, this position monitors and follows Title V air quality permits in the Tribe's areas of interest. This position is partially funded through Section 105 of the Clean Air Act.

Please see the Key Personnel Appendix for information on the qualifications of the individuals listed above.

QAPP updates:

The primary update to the QAPP for this project will be the inclusion of PurpleAir data streams. We will follow similar QA/QC procedures for the PurpleAir as those already established for the Radiance M903 nepholmeter in the current QAPP. These components will cover the following data quality indicators for PurpleAirs:

PurpleAir DQIs	Measurement Metric (preliminary)
Precision	Updated calibration factors derived from co-location of PurpleAirs with BAM 1020, and other reference monitoring stations in the project area.
Bias	Calibration factors will be applied to account for potential differential response due to temporal and geographic factors. We anticipate updating calibration coefficients quarterly and using data from the closest PurpleAir colocation with reference monitoring equipment. Wildfire events may also prompt updating coefficients if the quarterly updates to not capture their effect.
Accuracy	Calibration factors will be applied to align PurpleAir response magnitude with reference monitoring data. We anticipate updating calibration coefficients quarterly and using data from the closest PurpleAir colocation with reference monitoring equipment. Wildfire events may also prompt updating coefficients if the quarterly updates to not capture their effect.
Representativeness	Representativeness will be achieved by properly locating measurement equipment in a location that reflects the objectives of the sampling project.
Comparability	To ensure data will be comparable to similar environmental data, CTCLUSI personnel uses written, standardized procedures for sampling, sample handling, and sample analysis, which are always applied during data collection.
Completeness	Completeness is the measure of how much of a desired data set is collected, processed, and stored properly.
Sensitivity	Sensitivity is the ability of the instruments and techniques to accurately identify the presence or absence of the parameters being measured.

Data quality objectives will be developed and supported by the DQIs. These data quality objectives will be aligned with the goals the project – expanding our air quality network; providing air quality data and metrics which provide actionable information, and partnering with community organizations to address air quality risks.

PurpleAirs will also be routinely checked for proper functioning by having processing flags for data which is missing, extreme or out of measurement range, or illogical. Standard operating procedures will be developed and followed by all CTCLUSI personnel. Extra care will be made to ensure that the SOPs and associated materials will be clear and easily understood to help with institutionalizing the air monitoring plan, and making the QAPP a resource for other communities undertaking similar efforts.

Eriq Acosta

A: 1150 Hemlock Street Unit H30 • P: (970) 576-9631 • E: eriqacosta@gmail.com

Education, mental health and management professional with extensive knowledge and experience in individual and community engagement, mental health awareness and community outreach with extensive partnership development. Excellent communicator with strong interpersonal skills and ability to build, manage and supervise teams. Ability to apply analytical thinking and problem solving to assist in the growth and success of the organization.

SKILLS

- Leadership & Teams
- Compliance & Monitoring
- Diversity & Inclusion
- Curriculum Planning
- Student Support
- Quality Improvement
- Student Engagement
- Instructional Design
- Project Management

PROFESSIONAL EXPERIENCE

Management, Mental health and Education

Education Specialist II **Aug 2019- Oct 2020**
Confederated Tribes of Coos Lower Umpqua and Siuslaw Indians, Coos Bay Oregon

- Curriculum Instruction development and Implementation into and out of the classroom utilizing the Outdoor Experiential Education Model
- Grant search, maintenance, written proposals
- Youth support program, creation and implementation

Engagement Specialist **Aug 2019- Oct 2020**
Boulder Preparatory High School, Boulder Colorado

- Daily counseling and guidance sessions with the youth
- Curriculum Instruction development and Implementation into and out of the classroom utilizing the Outdoor Experiential Education Model
- Identified areas of improvement by consulting with staff and facilitating conversations about the school's mission and vision

Case Manager **Dec 2018- Aug 2019**
Boys Republic, Chino Hills California

- Facilitation of BR core guidelines with youth who come through the system for a 6 month cycle
- Development and implementation of Experiential Education Model to enhance BR's model

National Director **April 2017-Dec 2018**
Trees Water & People, Fort Collins Colorado

- Facilitate the development and implementation of programs to align with the vision and goals of the company
- Develop and plan informative training and educational programs to assist tribal communities with meeting goals
- Design and manage community-based and individualized training, facilitated in 4 different states
- Monitor and grow organization-wide budget by researching, writing, and applying for grants and various funding

Supervisor / Instructional Specialist **May 2015-April 2017**
Eagle Rock School and Professional Development Center, Estes Park, Colorado

- Managed, trained, and mentored instructional fellows by monitoring performance, and recommending training for licensure
- Created resources and taught instructional curriculum for 15+ classes to meet the school's compliance standards
- Identified areas of improvement by consulting with staff, and facilitating conversations about the school's mission and vision

- Established a working partnership with the area's high school to transfer knowledge of higher education instructional approaches

Assistant Director, El Centro/Adjunct Instructor **August 2013-July 2014**
Colorado State University, Fort Collins, Colorado

- Resolved educational gap from high school to college by creating a bridging program (Camino) for students to get to college
- Applied analytical thinking by identifying educational gaps, and remove barriers for students from diverse backgrounds
- Maintained compliance standards by tracking and monitoring all facets of the admissions process, while focusing on recruitment and retention of Hispanic graduate and undergraduate students

Co-Founder and Program Manager **August 2010-November 2014**
Red Horse Nation, Los Angeles, CA

- Acted as lead ambassador for organization by engaging and maintaining relationships with tribal organizations and governments
- Directed all operations of the organization including human resources, media. marketing, accounting, and budget development
- Provided outreach to community organizations by advocating for Equine Assisted Psychotherapy and promoting its benefits

Inside Admissions Recruiter **August 2010- November 2011**
Wyotech Laramie, Wyoming

- Recruited students by conducting phone consultations, and assisting prospective students with identifying their educational goals
- Partnered with existing contacts from tribal communities to discuss educational opportunities for indigenous students

Lead Evaluator/State Liaison/Case Manager **September 2006 – August 2010**
United American Indian Involvement, Los Angeles, CA

- Lead Evaluator: Assisted with setup and implementation of local and national evaluation process.
- State Liaison: Built relationships with American Indian and non-Indian agencies for the benefit of the organization as well as its clients.
- Case Manager: Provide wrap around care that is focused on the needs of the client.
- Supervisor:
- Development and implementation of practical continuous improvement processes for supervisee
- Effective management of employee performance including appraisals, support, training and discipline

EDUCATION

Master of Nonprofit Management, College for Professional Studies **September 2014**
Regis University, Denver, Colorado

Bachelor of Arts, Anthropology **May 2006**
Colorado State University, Fort Collins, Colorado

PROFESSIONAL AFFILIATIONS

Lifesavers Wild Horse Rescue, Lancaster, California	Board Member	**2013- 2016**
American Indian Children's Council, Los Angeles, CA	Board Member	**2006-2010**

Summary Page

Project Title: Enhancing air quality monitoring and community education for the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians

Applicant Organization: The Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians

Address: 1245 Fulton Avenue, Coos Bay, OR 97420

Program Contact: Roselynn Lwenya, Ph.D. Phone: (541) 435-7151; [HYPERLINK "mailto:rlwenya@ctclusi.org" \h]

DUNS Number: 161160445

Set Aside: This proposal is being submitted under the Tribal set-aside.

Brief Description of Applicant Organization

The Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI) is composed of constituent bands called the Hanis Coos, Miluk Coos, Lower Umpqua, and Siuslaw. These bands lived along the estuaries and banks of the Coos, Umpqua, and Siuslaw Rivers of Oregon since Time Immemorial. The ancestral homelands of the Tribe totals approximately 1.6 million acres located in southwestern Oregon. CTCLUSI's landholdings are composed of 94 parcels that total approximately 15,000 acres over seven watersheds. The Tribal Government works to protect the Tribal sovereignty and our culture by executing all legislative actions of the Tribal Council and General Council.

Partners

We are proudly partnering with a number of community organizations and technical support providers for this project, including:

- Oregon State University (OSU)
- Berkeley Air Monitoring Group (BAMG)
- Oregon Department of Environmental Quality (ODEQ)
- Lane Regional Air Protection Agency (LRAPA)
- City of Coos Bay
- Institute for Tribal Environmental Professionals (ITEP)
- Tribal Air Monitoring Support Center (TAMS)
- Coos Watershed Association (CoosWA): Improving the Health of our Watershed
- Willamette Partnership (WP)
- Tenmile Lakes Basin Partnership (TLBP)

Project Location: Our project will address Air Quality matters across the Tribe's five county service area in southwestern Oregon namely Coos, Curry, Douglas, Lane and Lincoln counties.

Air Pollutant Scope: PM2.5 and Carbon Monoxide

EPA Funding Requested: $500,000 (Large Grants): Total Project Cost: $500,000

Project Timeframe: November 1, 2022 to October 30, 2025

Project Summary and Approach

Communities throughout Oregon have expressed a need for additional air monitoring to manage local air quality. Oregon continues to feel the pressure from climate change, extreme drought and longer wildfire seasons. A number of adverse health impacts have been associated to exposure from $PM_{2.5}$ and PM_{10}. People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure. The CTCLUSI proposal is to increase community engagement on outdoor and indoor air quality, and develop a network of air quality monitors. The ability to have data to manage local air quality is dependent on having reliable and accurate equipment.

This project aims to expand our monitoring efforts and protect the health of our tribal community members, especially our elders, young, and other medically vulnerable people. We

plan to expand our existing monitoring network, conduct educational outreach, and provide the people with resources to improve air quality in our community. This project will improve public health, safety, environmental health and protection of Tribal members and resources, as well as the surrounding communities.

This project directly advances the EPA Strategic Plan goal by connecting Tribal needs with EPA priorities. Specifically, we are enhancing human and environmental health and supporting actions to reduce indoor and wildland fire smoke exposure especially among at-risk and harder-to-reach populations.

Scope of Work: Overall Project

The overall goal of this project is to ensure clean and healthy air by reducing the frequency and severity of air pollution exposure in our community. This effort will support the EPA Strategic Plan: Goal 4, "Ensure clean and healthy air for all communities; Objective 4.1, "improve air quality and reduce localized pollution and health impacts." We will monitor air pollutants in the communities within the Tribe's five county service areas: Coos, Curry, Douglas, Lane, and Lincoln counties. We will increase awareness of potential health impacts and interventions related to smoke events for the Tribal community. This means providing spatially relevant and near real time air quality data in an easily accessible and understandable way so people can make informed decisions about their health and activities. This will help people understand the relationship between indoor and ambient air quality. The specific goals and sub aims are as follows:

- Goal 1: Expand and improve our air monitoring network across the Coos, Umpqua, and Siuslaw lands with support from our technical partners.
    - Enhance ambient air monitoring by deploying at least 10 PurpleAir monitors in the CTCLUSI five county service area and providing additional monitors to Tribal members.
    - Update the CTCLUSI Air QAPP to reflect the emerging ambient air scenarios and enhanced monitoring network.
    - Work with technical partners (Berkeley Air, OSU, ODEQ, LRAPA, ITEP, and TAMS) to select and build monitoring sites, process data, and make it available in real time online for public use.
- Goal 2: Use real time outdoor and indoor air quality metrics to inform exposure mitigation actions (such as the use of air purifiers) during wildfire events and heating seasons.
    - Develop a dashboard and outreach materials illustrating relationships in air quality and heating sources.
    - Equip Tribal members with the instrumentation (PurpleAir monitors) and technical support to measure air quality ($PM_{2.5}$ and CO) and wood heating stove use at their homes.
    - Provide community members training on how to use the technology and tools provided, and how to link data to protective actions.
- Goal 3: Partner with community organizations to address air pollution hazards, and develop strategies to reduce exposures.
    - Conduct a needs assessment on critical air quality issues in the Tribe's service areas and develop action plans to implement recommendations arising from the assessment.
    - Promote partnerships and engagement with identified state and local agencies and communities to participate in planning, design and implementation.

- Collaborate with a select number of schools in the Tribe's five county service area to conduct ambient air monitoring and demonstration science events.

Project Significance and Problem Statement

Since Time Immemorial, our people have lived along the coasts of the Pacific Ocean and the Coos, Umpqua, and Siuslaw estuaries and tributaries. Our expansive homeland stretched from the Pacific Ocean to the forested slopes of the Coastal Mountain range of Oregon encompassing 1.6 million acres and 80 miles.

In 1855, CTCLUSI signed a treaty with the United States government that ceded our Ancestral Territory in exchange for compensation of ceded lands and a large reservation. Unfortunately, the treaty was never ratified. As a result, we were never appropriated a reservation or compensated for our lands. Most of our people were rounded up, confined, and then moved to the Alsea sub-agency area at the southern end of the Siletz Reservation. It is believed that about half of our people lost their lives during these dismal years because of disease, starvation, and exposure. In 1875, the Alsea sub-agency was opened for Euro-American settlement despite protests by our Chiefs, Headmen, and Tribal delegates. Our people became refugees in their own homeland and were forced to linger in the shadows of our Euro-American neighbors.

Nevertheless, we maintained our identity as Native People. In 1917, we officially banded together as CTCLUSI and established a formal elected government that we have maintained ever since. In 1941, the Bureau of Indian Affairs ("BIA") took a small parcel into trust for CTCLUSI in the City of Coos Bay, Oregon. On this small Reservation, the BIA also erected a Tribal Hall that included an assembly hall, kitchen, offices, and medical clinic. In 1954, the U.S. government terminated our federal recognition. We refused to accept the termination of our existence as a tribe. In 1984, after three decades of hard work, our federal recognition was restored.

At the time of restoration, CTCLUSI held only our Tribal Hall on six acres and three other slivers of land totaling less than eight acres, a far cry from our original 1.6 million acres. Since restoration, we have continued the work of reconstructing our fragmented land base and revitalizing our culture. As of today, the Tribe's Reservation and trust land base is greater than 14,800 acres, and more than 400 acres are held in fee.

Protecting the health of our Tribal members, especially vulnerable populations such as children and our elders, is critical for the Tribe's wellbeing and quality of life. Our elders connect us to our culture and heritage, and our children are our future. Exposure to air pollution, and $PM_{2.5}$, specifically, is associated with increased risk of respiratory infections, asthma incidence, cardiovascular disease, chronic obstructive pulmonary disease, COVID-19, and others [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"95KiIj9m","properties":{"formattedCitation":"(1\\uc0\\u8211{}3)","plainCitation":"(1–3)","noteIndex":0},"citationItems":[{"id":19744,"uris":["http://zotero.org/groups/73355/items/H8QUPUQY"],"itemData":{"id":19744,"type":"article-journal","abstract":"Background\n3 billion people worldwide rely on polluting fuels and technologies for domestic cooking and heating. We estimate the global, regional, and national health burden associated with exposure to household air pollution.\nMethods\nFor the systematic review and meta-analysis, we systematically searched four databases for studies published from database inception to April 2, 2020, that evaluated the risk of adverse cardiorespiratory, paediatric, and maternal outcomes from exposure to household air pollution, compared with no exposure. We used a random-effects model to calculate disease-specific relative risk (RR) meta-estimates. Household air pollution exposure was defined as use of polluting fuels (coal, wood, charcoal, agricultural wastes, animal dung, or kerosene) for household

cooking or heating. Temporal trends in mortality and disease burden associated with household air pollution, as measured by disability-adjusted life-years (DALYs), were estimated from 2000 to 2017 using exposure prevalence data from 183 of 193 UN member states. 95% CIs were estimated by propagating uncertainty from the RR meta-estimates, prevalence of household air pollution exposure, and disease-specific mortality and burden estimates using a simulation-based approach. This study is registered with PROSPERO, CRD42019125060.\nFindings\n476 studies (15·5 million participants) from 123 nations (99 [80%] of which were classified as low-income and middle-income) met the inclusion criteria. Household air pollution was positively associated with asthma (RR 1·23, 95% CI 1·11–1·36), acute respiratory infection in both adults (1·53, 1·22–1·93) and children (1·39, 1·29–1·49), chronic obstructive pulmonary disease (1·70, 1·47–1·97), lung cancer (1·69, 1·44–1·98), and tuberculosis (1·26, 1·08–1·48); cerebrovascular disease (1·09, 1·04–1·14) and ischaemic heart disease (1·10, 1·09–1·11); and low birthweight (1·36, 1·19–1·55) and stillbirth (1·22, 1·06–1·41); as well as with under-5 (1·25, 1·18–1·33), respiratory (1·19, 1·18–1·20), and cardiovascular (1·07, 1·04–1·11) mortality. Household air pollution was associated with 1·8 million (95% CI 1·1–2·7) deaths and 60·9 million (34·6–93·3) DALYs in 2017, with the burden overwhelmingly experienced in low-income and middle-income countries (LMICs; 60·8 million [34·6–92·9] DALYs) compared with high-income countries (0·09 million [0·01–0·40] DALYs). From 2000, mortality associated with household air pollution had reduced by 36% (95% CI 29–43) and disease burden by 30% (25–36), with the greatest reductions observed in higher-income nations.\nInterpretation\nThe burden of cardiorespiratory, paediatric, and maternal diseases associated with household air pollution has declined worldwide but remains high in the world's poorest regions. Urgent integrated health and energy strategies are needed to reduce the adverse health impact of household air pollution, especially in LMICs.\nFunding\nBritish Heart Foundation, Wellcome Trust.","container-title":"The Lancet Global Health","DOI":"10.1016/S2214-109X(20)30343-0","ISSN":"2214-109X","issue":"11","journalAbbreviation":"The Lancet Global Health","language":"en","page":"e1427-e1434","source":"ScienceDirect","title":"Adverse health effects associated with household air pollution: a systematic review, meta-analysis, and burden estimation study","title-short":"Adverse health effects associated with household air pollution","volume":"8","author":[{"family":"Lee","given":"Kuan Ken"},{"family":"Bing","given":"Rong"},{"family":"Kiang","given":"Joanne"},{"family":"Bashir","given":"Sophia"},{"family":"Spath","given":"Nicholas"},{"family":"Stelzle","given":"Dominik"},{"family":"Mortimer","given":"Kevin"},{"family":"Bularga","given":"Anda"},{"family":"Doudesis","given":"Dimitrios"},{"family":"Joshi","given":"Shruti S"},{"family":"Strachan","given":"Fiona"},{"family":"Gumy","given":"Sophie"},{"family":"Adair-Rohani","given":"Heather"},{"family":"Attia","given":"Engi F"},{"family":"Chung","given":"Michael H"},{"family":"Miller","given":"Mark R"},{"family":"Newby","given":"David E"},{"family":"Mills","given":"Nicholas L"},{"family":"McAllister","given":"David A"},{"family":"Shah","given":"Anoop S V"}],"issued":{"date-parts":[["2020",11,1]]}}},{"id":17699,"uris":["http://zotero.org/groups/2412200/items/W436LGY9"],"itemData":{"id":17699,"type":"article-journal","abstract":"<h2>Summary</h2><h3>Background</h3><p>Rigorous analysis of levels and trends in exposure to leading risk factors and quantification of their effect on human health are important to identify where public health is making progress and in which cases current efforts are inadequate. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019

provides a standardised and comprehensive assessment of the magnitude of risk factor exposure, relative risk, and attributable burden of disease. <h3>Methods</h3> GBD 2019 estimated attributable mortality, years of life lost (YLLs), years of life lived with disability (YLDs), and disability-adjusted life-years (DALYs) for 87 risk factors and combinations of risk factors, at the global level, regionally, and for 204 countries and territories. GBD uses a hierarchical list of risk factors so that specific risk factors (eg, sodium intake), and related aggregates (eg, diet quality), are both evaluated. This method has six analytical steps. (1) We included 560 risk–outcome pairs that met criteria for convincing or probable evidence on the basis of research studies. 12 risk–outcome pairs included in GBD 2017 no longer met inclusion criteria and 47 risk–outcome pairs for risks already included in GBD 2017 were added based on new evidence. (2) Relative risks were estimated as a function of exposure based on published systematic reviews, 81 systematic reviews done for GBD 2019, and meta-regression. (3) Levels of exposure in each age-sex-location-year included in the study were estimated based on all available data sources using spatiotemporal Gaussian process regression, DisMod-MR 2.1, a Bayesian meta-regression method, or alternative methods. (4) We determined, from published trials or cohort studies, the level of exposure associated with minimum risk, called the theoretical minimum risk exposure level. (5) Attributable deaths, YLLs, YLDs, and DALYs were computed by multiplying population attributable fractions (PAFs) by the relevant outcome quantity for each age-sex-location-year. (6) PAFs and attributable burden for combinations of risk factors were estimated taking into account mediation of different risk factors through other risk factors. Across all six analytical steps, 30 652 distinct data sources were used in the analysis. Uncertainty in each step of the analysis was propagated into the final estimates of attributable burden. Exposure levels for dichotomous, polytomous, and continuous risk factors were summarised with use of the summary exposure value to facilitate comparisons over time, across location, and across risks. Because the entire time series from 1990 to 2019 has been re-estimated with use of consistent data and methods, these results supersede previously published GBD estimates of attributable burden. <h3>Findings</h3> The largest declines in risk exposure from 2010 to 2019 were among a set of risks that are strongly linked to social and economic development, including household air pollution; unsafe water, sanitation, and handwashing; and child growth failure. Global declines also occurred for tobacco smoking and lead exposure. The largest increases in risk exposure were for ambient particulate matter pollution, drug use, high fasting plasma glucose, and high body-mass index. In 2019, the leading Level 2 risk factor globally for attributable deaths was high systolic blood pressure, which accounted for 10·8 million (95% uncertainty interval [UI] 9·51–12·1) deaths (19·2% [16·9–21·3] of all deaths in 2019), followed by tobacco (smoked, second-hand, and chewing), which accounted for 8·71 million (8·12–9·31) deaths (15·4% [14·6–16·2] of all deaths in 2019). The leading Level 2 risk factor for attributable DALYs globally in 2019 was child and maternal malnutrition, which largely affects health in the youngest age groups and accounted for 295 million (253–350) DALYs (11·6% [10·3–13·1] of all global DALYs that year). The risk factor burden varied considerably in 2019 between age groups and locations. Among children aged 0–9 years, the three leading detailed risk factors for attributable DALYs were all related to malnutrition. Iron deficiency was the leading risk factor for those aged 10–24 years, alcohol use for those aged 25–49 years, and high systolic blood pressure for those aged 50–74 years and 75 years and older. <h3>Interpretation</h3> Overall, the record for reducing exposure to harmful risks over the past three decades is poor. Success with reducing smoking and lead exposure through regulatory policy might point the way for a stronger role for public policy on other risks in addition to continued efforts to provide information on risk factor harm to the general

public. <h3>Funding</h3> Bill & Melinda Gates Foundation. ","container-title":"The Lancet","DOI":"10.1016/S0140-6736(20)30752-2","ISSN":"0140-6736, 1474-547X","issue":"10258","journalAbbreviation":"The Lancet","language":"English","note":"publisher: Elsevier","page":"1223-1249","source":"www.thelancet.com","title":"Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019","title-short":"Global burden of 87 risk factors in 204 countries and territories, 1990–2019","volume":"396","author":[{"family":"Murray","given":"Christopher J. L."},{"family":"Aravkin","given":"Aleksandr Y."},{"family":"Zheng","given":"Peng"},{"family":"Abbafati","given":"Cristiana"},{"family":"Abbas","given":"Kaja M."},{"family":"Abbasi-Kangevari","given":"Mohsen"},{"family":"Abd-Allah","given":"Foad"},{"family":"Abdelalim","given":"Ahmed"},{"family":"Abdollahi","given":"Mohammad"},{"family":"Abdollahpour","given":"Ibrahim"},{"family":"Abegaz","given":"Kedir Hussein"},{"family":"Abolhassani","given":"Hassan"},{"family":"Aboyans","given":"Victor"},{"family":"Abreu","given":"Lucas Guimarães"},{"family":"Abrigo","given":"Michael R. M."},{"family":"Abualhasan","given":"Ahmed"},{"family":"Abu-Raddad","given":"Laith Jamal"},{"family":"Abushouk","given":"Abdelrahman I."},{"family":"Adabi","given":"Maryam"},{"family":"Adekanmbi","given":"Victor"},{"family":"Adeoye","given":"Abiodun Moshood"},{"family":"Adetokunboh","given":"Olatunji O."},{"family":"Adham","given":"Davoud"},{"family":"Advani","given":"Shailesh M."},{"family":"Agarwal","given":"Gina"},{"family":"Aghamir","given":"Seyed Mohammad Kazem"},{"family":"Agrawal","given":"Anurag"},{"family":"Ahmad","given":"Tauseef"},{"family":"Ahmadi","given":"Keivan"},{"family":"Ahmadi","given":"Mehdi"},{"family":"Ahmadieh","given":"Hamid"},{"family":"Ahmed","given":"Muktar Beshir"},{"family":"Akalu","given":"Temesgen Yihunie"},{"family":"Akinyemi","given":"Rufus Olusola"},{"family":"Akinyemiju","given":"Tomi"},{"family":"Akombi","given":"Blessing"},{"family":"Akunna","given":"Chisom Joyqueenet"},{"family":"Alahdab","given":"Fares"},{"family":"Al-Aly","given":"Ziyad"},{"family":"Alam","given":"Khurshid"},{"family":"Alam","given":"Samiah"},{"family":"Alam","given":"Tahiya"},{"family":"Alanezi","given":"Fahad Mashhour"},{"family":"Alanzi","given":"Turki M."},{"family":"Alemu","given":"Biresaw","dropping-particle":"wassihun"},{"family":"Alhabib","given":"Khalid F."},{"family":"Ali","given":"Muhammad"},{"family":"Ali","given":"Saqib"},{"family":"Alicandro","given":"Gianfranco"},{"family":"Alinia","given":"Cyrus"},{"family":"Alipour","given":"Vahid"},{"family":"Alizade","given":"Hesam"},{"family":"Aljunid","given":"Syed Mohamed"},{"family":"Alla","given":"François"},{"family":"Allebeck","given":"Peter"},{"family":"Almasi-Hashiani","given":"Amir"},{"family":"Al-Mekhlafi","given":"Hesham M."},{"family":"Alonso","given":"Jordi"},{"family":"Altirkawi","given":"Khalid A."},{"family":"Amini-Rarani","given":"Mostafa"},{"family":"Amiri","given":"Fatemeh"},{"family":"Amugsi","given":"Dickson A."},{"family":"Ancuceanu","given":"Robert"},{"family":"Anderlini","given":"Deanna"},{"family":"Anderson","given":"Jason A."},{"family":"Andrei","given":"Catalina

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state of art relating the role of air pollution, in particular PM2.5, PM10 and NO2, in COVID-19 spread and lethality. The Authors, who first investigated this association, often used different research methods or not all include confounding factors whenever possible. In addition, to date incidence data are underestimated in all countries and to a lesser extent also mortality data. For this reason, the cases included in the reviewed studies cannot be considered conclusive. Although it determines important limitations for direct comparison of results, and more studies are needed to strengthen scientific evidences and support firm conclusions, major findings are consistent, highlighting the important contribution of PM2.5 and NO2 as triggering of the COVID-19 spread and lethality, and with a less extent also PM10, although the potential effect of airborne virus exposure it has not been still demonstrated.","container-title":"Environmental Research","DOI":"10.1016/j.envres.2020.110129","ISSN":"0013-9351","journalAbbreviation":"Environmental Research","language":"en","source":"ScienceDirect","title":"The role of air pollution (PM and NO2) in COVID-19 spread and lethality: A systematic review","title-short":"The role of air pollution (PM and NO2) in COVID-19 spread and lethality","URL":"http://www.sciencedirect.com/science/article/pii/S0013935120310264","volume":"191","author":[{"family":"Copat","given":"Chiara"},{"family":"Cristaldi","given":"Antonio"},{"family":"Fiore","given":"Maria"},{"family":"Grasso","given":"Alfina"},{"family":"Zuccarello","given":"Pietro"},{"family":"Signorelli","given":"Salvatore Santo"},{"family":"Conti","given":"Gea Oliveri"},{"family":"Ferrante","given":"Margherita"}],"accessed":{"date-parts":[["2020",9,21]]},"issued":{"date-parts":[["2020"]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}].

Although air pollution comes from many sources, there are two main air pollution sources of concern for our community: wildfires and wood-fueled heating. First, air quality is being increasingly impacted by wildfires in the west [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"aBIOHBgW","properties":{"formattedCitation":"(4,5)","plainCitation":"(4,5)","noteIndex":0},"citationItems":[{"id":19781,"uris":["http://zotero.org/groups/73355/items/UVC79WFA"],"itemData":{"id":19781,"type":"article-journal","abstract":"Recent dramatic and deadly increases in global wildfire activity have increased attention on the causes of wildfires, their consequences, and how risk from wildfire might be mitigated. Here we bring together data on the changing risk and societal burden of wildfire in the United States. We estimate that nearly 50 million homes are currently in the wildland–urban interface in the United States, a number increasing by 1 million houses every 3 y. To illustrate how changes in wildfire activity might affect air pollution and related health outcomes, and how these linkages might guide future science and policy, we develop a statistical model that relates satellite-based fire and smoke data to information from pollution monitoring stations. Using the model, we estimate that wildfires have accounted for up to 25% of PM2.5 (particulate matter with diameter <2.5 μm) in recent years across the United States, and up to half in some Western regions, with spatial patterns in ambient smoke exposure that do not follow traditional socioeconomic pollution exposure gradients. We combine the model with stylized scenarios to show that fuel management interventions could have large health benefits and that future health impacts from climate-change–induced wildfire smoke could approach projected overall increases in temperature-related mortality from climate change—but that both estimates remain uncertain. We use model results to highlight important areas for future research and to draw lessons for policy.","container-title":"Proceedings of the National Academy

of Sciences","DOI":"10.1073/pnas.2011048118","ISSN":"0027-8424, 1091-6490","issue":"2","journalAbbreviation":"PNAS","language":"en","note":"publisher: National Academy of Sciences\nsection: Perspective\nPMID: 33431571","source":"www.pnas.org","title":"The changing risk and burden of wildfire in the United States","URL":"https://www.pnas.org/content/118/2/e2011048118","volume":"118","author":[{"family":"Burke","given":"Marshall"},{"family":"Driscoll","given":"Anne"},{"family":"Heft-Neal","given":"Sam"},{"family":"Xue","given":"Jiani"},{"family":"Burney","given":"Jennifer"},{"family":"Wara","given":"Michael"}],"accessed":{"date-parts":[["2021",8,7]]},"issued":{"date-parts":[["2021"]]}}},{"id":19786,"uris":["http://zotero.org/groups/73355/items/7TCSMKSC"],"itemData":{"id":19786,"type":"article-journal","abstract":"ABSTRACT Increased wildland fire activity is producing extreme fine particulate matter (PM2.5) concentrations impacting millions of people every year, especially in the western United States (US). Recommendations for limiting exposure to PM2.5 and associated adverse health outcomes focus on staying inside, closing windows and doors, and increasing filtration; however, relatively little is known about indoor air quality (IAQ) during major smoke events. Indoor and outdoor hourly PM2.5 (μg m–3) measurements from the publicly available PurpleAir sensor (PAS) network were analyzed for 42 sites (26 residential, 6 school, 10 commercial) across the western US during a September 2020 period of heavy wildfire smoke influence. The fraction of ambient PM2.5 that penetrates indoors and remains airborne (Fin), as well as the ratio (I/O) and correlation coefficient (R2) of indoor to outdoor PM2.5 concentrations, were lower in residential compared to commercial and school buildings. Interventions to improve IAQ were highly influential in PM2.5 infiltration in residential case studies, with multiple, continuously run filter units associated with lower Fin, I/O, and R2. A low-cost PM2.5 filtration method consisting of a Minimum Efficiency Rating Value-13 (MERV-13) filter attached to a box fan is evaluated as an alternative for improving IAQ during wildland fire smoke events. The MERV-13 fan filter unit proved highly effective at reducing indoor PM2.5 and particles 0.3–1.0 μm measured by PAS and a particle counter, respectively, when recirculating air in a single room. Low-cost filtration methods can have significant benefit for filtering submicron smoke particles and may reduce exposure to PM2.5 during wildfire smoke events.","container-title":"Aerosol and Air Quality Research","DOI":"10.4209/aaqr.210046","ISSN":"2071-1409","issue":"7","journalAbbreviation":"Aerosol Air Qual. Res.","language":"en","note":"publisher: Taiwan Association for Aerosol Research","page":"210046","source":"aaqr.org","title":"Impact of Wildfire Smoke Events on Indoor Air Quality and Evaluation of a Low-cost Filtration Method","volume":"21","author":[{"family":"May","given":"Nathaniel W."},{"family":"Dixon","given":"Clara"},{"family":"Jaffe","given":"Daniel A."}],"issued":{"date-parts":[["2021"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}] and research from these events has linked wildfire smoke to increased susceptibility to respiratory infections including COVID-19 [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"3Ag4b7cr","properties":{"formattedCitation":"(6)","plainCitation":"(6)","noteIndex":0},"citationItems":[{"id":19952,"uris":["http://zotero.org/groups/73355/items/7ZAPNXI8"],"itemData":{"id":19952,"type":"article-journal","abstract":"The year 2020 brought unimaginable challenges in public health, with the confluence of the COVID-19 pandemic and wildfires across

the western United States. Wildfires produce high levels of fine particulate matter (PM2.5). Recent studies reported that short-term exposure to PM2.5 is associated with increased risk of COVID-19 cases and deaths. We acquired and linked publicly available daily data on PM2.5, the number of COVID-19 cases and deaths, and other confounders for 92 western U.S. counties that were affected by the 2020 wildfires. We estimated the association between short-term exposure to PM2.5 during the wildfires and the epidemiological dynamics of COVID-19 cases and deaths. We adjusted for several time-varying confounding factors (e.g., weather, seasonality, long-term trends, mobility, and population size). We found strong evidence that wildfires amplified the effect of short-term exposure to PM2.5 on COVID-19 cases and deaths, although with substantial heterogeneity across counties.\nHigh levels of PM2.5 during the 2020 wildfires in the western United States led to an excess of COVID-19 cases and deaths.\nHigh levels of PM2.5 during the 2020 wildfires in the western United States led to an excess of COVID-19 cases and deaths.","container-title":"Science Advances","DOI":"10.1126/sciadv.abi8789","ISSN":"2375-2548","issue":"33","language":"en","note":"publisher: American Association for the Advancement of Science\nsection: Research Article\nPMID: 34389545","page":"eabi8789","source":"advances.sciencemag.org","title":"Excess of COVID-19 cases and deaths due to fine particulate matter exposure during the 2020 wildfires in the United States","volume":"7","author":[{"family":"Zhou","given":"Xiaodan"},{"family":"Josey","given":"Kevin"},{"family":"Kamareddine","given":"Leila"},{"family":"Caine","given":"Miah C."},{"family":"Liu","given":"Tianjia"},{"family":"Mickley","given":"Loretta J."},{"family":"Cooper","given":"Matthew"},{"family":"Dominici","given":"Francesca"}],"issued":{"date-parts":[["2021",8,1]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}], as well as overall increases in mortality and morbidity [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"nOXrlfFR","properties":{"formattedCitation":"(4,7,8)","plainCitation":"(4,7,8)","noteIndex":0},"citationItems":[{"id":19781,"uris":["http://zotero.org/groups/73355/items/UVC79WFA"],"itemData":{"id":19781,"type":"article-journal","abstract":"Recent dramatic and deadly increases in global wildfire activity have increased attention on the causes of wildfires, their consequences, and how risk from wildfire might be mitigated. Here we bring together data on the changing risk and societal burden of wildfire in the United States. We estimate that nearly 50 million homes are currently in the wildland–urban interface in the United States, a number increasing by 1 million houses every 3 y. To illustrate how changes in wildfire activity might affect air pollution and related health outcomes, and how these linkages might guide future science and policy, we develop a statistical model that relates satellite-based fire and smoke data to information from pollution monitoring stations. Using the model, we estimate that wildfires have accounted for up to 25% of PM2.5 (particulate matter with diameter <2.5 μm) in recent years across the United States, and up to half in some Western regions, with spatial patterns in ambient smoke exposure that do not follow traditional socioeconomic pollution exposure gradients. We combine the model with stylized scenarios to show that fuel management interventions could have large health benefits and that future health impacts from climate-change–induced wildfire smoke could approach projected overall increases in temperature-related mortality from climate change—but that both estimates remain uncertain. We use model results to highlight important areas for future research and to draw lessons for policy.","container-title":"Proceedings of the National Academy of Sciences","DOI":"10.1073/pnas.2011048118","ISSN":"0027-8424, 1091-6490","issue":"2","journalAbbreviation":"PNAS","language":"en","note":"publisher: National Academy of Sciences\nsection: Perspective\nPMID:

33431571","source":"www.pnas.org","title":"The changing risk and burden of wildfire in the United
States","URL":"https://www.pnas.org/content/118/2/e2011048118","volume":"118","author":[{"family":"Burke","given":"Marshall"},{"family":"Driscoll","given":"Anne"},{"family":"Heft-Neal","given":"Sam"},{"family":"Xue","given":"Jiani"},{"family":"Burney","given":"Jennifer"},{"family":"Wara","given":"Michael"}],"accessed":{"date-parts":[["2021",8,7]]},"issued":{"date-parts":[["2021"]]}}},{"id":21486,"uris":["http://zotero.org/groups/73355/items/S7PUVJUM"],"itemData":{"id":21486,"type":"article-journal","abstract":"Major wildfires that started in the summer of 2020 along the west coast of the U.S. have made PM2.5 concentrations in cities in this region rank among the highest in the world. Regions of Washington were impacted by active wildfires in the state, and by aged wood smoke transported from fires in Oregon and California. This study aims to assess the population health impact of increased PM2.5 concentrations attributable to the wildfire. Average daily PM2.5 concentrations for each county before and during the 2020 Washington wildfire episode were obtained from the Washington Department of Ecology. Utilizing previously established associations of short-term mortality for PM2.5, we estimated excess mortality for Washington attributable to the increased PM2.5 levels. On average, PM2.5 concentrations increased 91.7 μg/m3 during the wildfire episode. Each week of wildfire smoke exposures was estimated to result in 87.6 (95% CI: 70.9, 103.1) cases of increased all-cause mortality, 19.1 (95% CI: 10.0, 28.2) increased cardiovascular disease deaths, and 9.4 (95% CI: 5.1, 13.5) increased respiratory disease deaths. Because wildfire smoke episodes are likely to continue impacting the Pacific Northwest in future years, continued preparedness and mitigations to reduce exposures to wildfire smoke are necessary to avoid this excess health burden.","container-title":"medRxiv","DOI":"10.1101/2020.09.19.20197921","journalAbbreviation":"medRxiv","note":"PMID: 32995819\nPMCID: PMC7523160","source":"PubMed Central","title":"Health Impact Assessment of PM2.5 attributable mortality from the September 2020 Washington State Wildfire Smoke Episode","URL":"https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7523160/","author":[{"family":"Liu","given":"Yisi"},{"family":"Austin","given":"Elena"},{"family":"Xiang","given":"Jianbang"},{"family":"Gould","given":"Tim"},{"family":"Larson","given":"Tim"},{"family":"Seto","given":"Edmund"}],"accessed":{"date-parts":[["2020",12,9]]},"issued":{"date-parts":[["2020",10,20]]}}},{"id":23700,"uris":["http://zotero.org/groups/73355/items/JFRQI4CJ"],"itemData":{"id":23700,"type":"article-journal","abstract":"Wildfires can be detrimental to urban and rural communities, causing impacts in the form of psychological stress, direct physical injury, and smoke-related morbidity and mortality. This study examined the area burned by wildfires over the entire state of California from the years 2000 to 2020 in order to quantify and identify whether burned area and fire frequency differed across Census tracts according to socioeconomic indicators over time. Wildfire data were obtained from the California Fire and Resource Assessment Program (FRAP) and National Interagency Fire Center (NIFC), while demographic data were obtained from the American Community Survey. Results showed a doubling in the number of Census tracts that experienced major wildfires and a near doubling in the number of people residing in wildfire-impacted Census tracts, mostly due to an over 23,000 acre/year increase in the area burned by wildfires over the last two decades. Census tracts with a higher fire frequency and burned area had lower proportions of minority groups on average. However, when considering Native American populations, a greater proportion resided in highly

impacted Census tracts. Such Census tracts also had higher proportions of older residents. In general, high-impact Census tracts tended to have higher proportions of low-income residents and lower proportions of high-income residents, as well as lower median household incomes and home values. These findings are important to policymakers and state agencies as it relates to environmental justice and the allocation of resources before, during, and after wildfires in the state of California.","container-title":"International Journal of Environmental Research and Public Health","DOI":"10.3390/ijerph18083921","ISSN":"1660-4601","issue":"8","language":"en","note":"number: 8\npublisher: Multidisciplinary Digital Publishing Institute","page":"3921","source":"www.mdpi.com","title":"Disproportionate Impacts of Wildfires among Elderly and Low-Income Communities in California from 2000–2020","volume":"18","author":[{"family":"Masri","given":"Shahir"},{"family":"Scaduto","given":"Erica"},{"family":"Jin","given":"Yufang"},{"family":"Wu","given":"Jun"}],"issued":{"date-parts":[["2021",1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. Climate scientists predict that wildfires and the associated air pollution events in our area will continue to get longer and more intense [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lhLJzIQA","properties":{"formattedCitation":"(4)","plainCitation":"(4)","noteIndex":0},"citationItems":[{"id":19781,"uris":["http://zotero.org/groups/73355/items/UVC79WFA"],"itemData":{"id":19781,"type":"article-journal","abstract":"Recent dramatic and deadly increases in global wildfire activity have increased attention on the causes of wildfires, their consequences, and how risk from wildfire might be mitigated. Here we bring together data on the changing risk and societal burden of wildfire in the United States. We estimate that nearly 50 million homes are currently in the wildland–urban interface in the United States, a number increasing by 1 million houses every 3 y. To illustrate how changes in wildfire activity might affect air pollution and related health outcomes, and how these linkages might guide future science and policy, we develop a statistical model that relates satellite-based fire and smoke data to information from pollution monitoring stations. Using the model, we estimate that wildfires have accounted for up to 25% of PM2.5 (particulate matter with diameter <2.5 μm) in recent years across the United States, and up to half in some Western regions, with spatial patterns in ambient smoke exposure that do not follow traditional socioeconomic pollution exposure gradients. We combine the model with stylized scenarios to show that fuel management interventions could have large health benefits and that future health impacts from climate-change–induced wildfire smoke could approach projected overall increases in temperature-related mortality from climate change—but that both estimates remain uncertain. We use model results to highlight important areas for future research and to draw lessons for policy.","container-title":"Proceedings of the National Academy of Sciences","DOI":"10.1073/pnas.2011048118","ISSN":"0027-8424, 1091-6490","issue":"2","journalAbbreviation":"PNAS","language":"en","note":"publisher: National Academy of Sciences\nsection: Perspective\nPMID: 33431571","source":"www.pnas.org","title":"The changing risk and burden of wildfire in the United States","URL":"https://www.pnas.org/content/118/2/e2011048118","volume":"118","author":[{"family":"Burke","given":"Marshall"},{"family":"Driscoll","given":"Anne"},{"family":"Heft-Neal","given":"Sam"},{"family":"Xue","given":"Jiani"},{"family":"Burney","given":"Jennifer"},{"family":"Wara","given":"Michael"}],"accessed":{"date-parts":[["2021",8,7]]},"issued":{"date-

parts":[["2021"]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}].

Air quality is also impacted in our region by wood-fueled heating stoves. Nationally, wood stoves and fireplaces emit 345,000 tons of $PM_{2.5}$ into the air each year, and account for 44 percent of total stationary and mobile polycyclic organic matter emissions, nearly 25% of all area source air toxic cancer risks and 15 percent of noncancer respiratory effects [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NAIqbeR7","properties":{"formattedCitation":"(9)","plainCitation":"(9)","noteIndex":0},"citationItems":[{"id":23696,"uris":["http://zotero.org/groups/73355/items/IM2VMZ2H"],"itemData":{"id":23696,"type":"report","event-place":"Washington DC","publisher":"United States Environmental Protection Agency","publisher-place":"Washington DC","title":"Strategies for Reducing Residential Wood Smoke","URL":"https://www.epa.gov/burnwise/strategies-reducing-residential-wood-smoke","author":[{"family":"USEPA","given":""}],"issued":{"date-parts":[["2013"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. These regional pollutants persist despite improved stove certification programs because 65% of the 12 million wood heaters in use today are still older, inefficient devices [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"z250gEDo","properties":{"formattedCitation":"(9)","plainCitation":"(9)","noteIndex":0},"citationItems":[{"id":23696,"uris":["http://zotero.org/groups/73355/items/IM2VMZ2H"],"itemData":{"id":23696,"type":"report","event-place":"Washington DC","publisher":"United States Environmental Protection Agency","publisher-place":"Washington DC","title":"Strategies for Reducing Residential Wood Smoke","URL":"https://www.epa.gov/burnwise/strategies-reducing-residential-wood-smoke","author":[{"family":"USEPA","given":""}],"issued":{"date-parts":[["2013"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}].

During heating seasons, studies have shown woodsmoke is the dominant source of ambient $PM_{2.5}$ in many rural communities similar to ours [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"s7kzBntX","properties":{"formattedCitation":"(10\\uc0\\u8211{}12)","plainCitation":"(10–12)","noteIndex":0},"citationItems":[{"id":23621,"uris":["http://zotero.org/groups/73355/items/TZ82RSII"],"itemData":{"id":23621,"type":"article-journal","abstract":"Wood smoke from residential wood combustion is a significant source of elevated PM2.5 in many communities across the Northwest U.S. Accurate representation of residential wood combustion in source-oriented regional scale air quality models is challenging because of multiple uncertainties. As an alternative to source-oriented source apportionment, this work provides, through receptor-oriented source apportionment, an assessment of winter residential wood combustion impacts at multiple Northwest U.S. locations. Source apportionment was performed on chemically speciated PM2.5 from 19 monitoring sites using the Positive Matrix Factorization (PMF) receptor model. Each site was modeled independently, but a common data preparation and modeling protocol was used so that results were as comparable as possible across sites. Model solutions had from 4 to 8 PMF factors, depending on the site. PMF factors at each site were associated with a source classification (e.g., primary wood smoke), a dominant chemical composition (e.g., ammonium nitrate), or were some mixture. 15 different sources or chemical compositions were identified as contributing to PM2.5 across the 19 sites. The 6 most common were; aged wood smoke and secondary organic carbon, motor vehicles, primary wood smoke,

ammonium nitrate, ammonium sulfate, and fugitive dust. Wood smoke was identified at every site, with both aged and primary wood smoke identified at most sites. Wood smoke contributions to PM2.5 were averaged for the two winter months of December and January, the months when wood smoke in the Northwest U.S. is mainly from residential wood combustion. The total contribution of residential wood combustion, that from primary plus aged smoke, ranged from 11.4% to 92.7% of average December and January PM2.5 depending on the site, with the highest percent contributions occurring in smaller towns that have fewer expected sources of winter PM2.5. Receptor modeling at multiple sites, such as that conducted in this work, provided some significant advantages over modeling a single or small number of sites. Analysis at multiple sites allowed common factor chemical compositions to be identified, making it easier to evaluate when a PMF factor at a particular site represents a mix of sources versus a single source. The identification of similar PMF factors across multiple sites also allowed average chemical profiles to be established for the 6 the most commonly identified PM2.5 sources or compositions in this study. These average profiles have the potential to be used as source profile inputs in future Chemical Mass Balance receptor modeling, when a limited number of samples may restrict the ability to conduct PMF receptor modeling, or when the availability of local source profiles is limited. Receptor modeling results spanning a range of community sizes and source compositions, as in this study, could be used to evaluate and improve the representation of wood smoke and other specific sources in source-oriented regional scale air quality models by providing an independent source impact assessment.","container-title":"Atmospheric Environment","DOI":"10.1016/j.atmosenv.2016.07.048","ISSN":"1352-2310","journalAbbreviation":"Atmospheric Environment","language":"en","page":"210-219","source":"ScienceDirect","title":"Source apportionment of PM2.5 at multiple Northwest U.S. sites: Assessing regional winter wood smoke impacts from residential wood combustion","title-short":"Source apportionment of PM2.5 at multiple Northwest U.S. sites","volume":"142","author":[{"family":"Kotchenruther","given":"Robert A."}],"issued":{"date-parts":[["2016",10,1]]}}},{"id":23628,"uris":["http://zotero.org/groups/73355/items/B8PQLFP3"],"itemData":{"id":23628,"type":"article-journal","abstract":"In the Northwest U.S. elevated measurements of PM2.5 from anthropogenic sources occur most often in winter.\nMajor contributors to winter PM2.5 are direct primary emissions of wood smoke from residential wood combustion, primary emissions from motor vehicles, gaseous NOx emissions leading to particulate nitrate, and primary and secondary sources of particulate sulfate. A number of communities in the Northwest U.S. now have\nlong data records of chemically speciated PM2.5 from which receptor-based source apportionment can be performed. This work uses receptor-based source apportionment on data from these monitoring sites to evaluate\nchanges in the major contributors to winter PM2.5 over the available monitoring time span. Data from 9 sites are\nanalyzed in this work using the Positive Matrix Factorization (PMF) source apportionment model. Each site was\nmodeled individually rather than grouping the data from multiple sites. All sites had data through the summer of\n2018, with most sites having 11 years of data and one site having 9 years of data. The number of PMF factors\nidentified was between 5 and 10, depending on the site. Associations were made between PMF factors and PM2.5\nsources based on comparison of PMF factor chemical profiles with published source test data and source profiles\nidentified in other published studies. The most common factors found were: fresh wood smoke, aged wood\nsmoke, soil dust, gas engines, mixed – gas engines and nitrate, ammonium sulfate, and ammonium nitrate. In this\nwork, total wood smoke was identified as the combined

contribution of fresh and aged wood smoke, and winter\nseason data was defined as encompassing the last two months of a year and the first two months of the next year.\nTo evaluate changes over time, average winter season PM2.5 measurements, major PM2.5 chemical components,\nand PMF factor results for the winter seasons of 2007–2009 were compared with the winter seasons of\n2015–2017. The result for total 3-year average winter season PM2.5 was a decrease between 2% and 29% at the 9\nsites, and the decreases were statistically significant at 3 sites. However, total winter season wood smoke contributions to PM2.5 decreased at every site between the two 3-year periods and the decreases were statistically\nsignificant at 8 of 9 sites, with decreases from 48% to 74% at those 8 sites. All PMF factors associated with\nammonium nitrate (identified at 5 of 9 sites) decreased a statistically significant 11%–54% between the two 3-\nyear winter season periods. All PMF factors associated with ammonium sulfate (identified at 7 of 9 sites)\ndecreased a statistically significant 27%–81% between the two 3-year winter season periods. In contrast to the\nsignificant reductions in PM2.5 from PMF factors related to wood smoke, ammonium nitrate and ammonium\nsulfate, PMF factors associated with gas engines increased from 6% to 226% between the two 3-year winter\nseason periods. Increases in PM2.5 contributions from gas engine related factors explain why overall average winter season PM2.5 had more modest percent reductions compared to the percent reductions for wood smoke,\nammonium nitrate, and ammonium sulfate factors between the two 3-year winter season periods.","container-title":"Atmospheric Environment","DOI":"https://doi.org/10.1016/j.atmosenv.2020.117724","title":"Recent changes in winter PM2.5 contributions from wood smoke, motor vehicles, and other sources in the Northwest U.S.","URL":"https://www-sciencedirect-com.ezproxy.proxy.library.oregonstate.edu/science/article/pii/S1352231020304568","volume":"237","author":[{"family":"Kotchenruther","given":"Robert A."}],"accessed":{"date-parts":[["2022",2,24]]},"issued":{"date-parts":[["2020",9,15]]}}},{"id":23690,"uris":["http://zotero.org/groups/73355/items/MGTERU8J"],"itemData":{"id":23690,"type":"article-journal","abstract":"This study used the Environmental Protection Agency's positive matrix factorization model (EPA PMF5.0) to identify five primary source factors contributing to the ambient PM2.5 concentrations at Cheeka Peak Atmospheric Observatory (CPO), Neah Bay WA between January 2011 and December 2014. CPO is home to both an IMPROVE (Interagency Monitoring for Protected Visual Environments) and a NCore multi-pollutant monitoring site. Chemically resolved particulate data from the IMPROVE site was the input data to EPA PMF5.0 and the resulting source factors were derived solely from these data. Solutions from the model were analyzed in context with trace gas and meteorological data collected at the NCore site located roughly 10 m away. Seasonal and long-term trends were analyzed for all five factors and provide the first complete source apportionment analysis of PM2.5 at this remote location. The first factor, identified as marine-traffic residual fuel oil (RFO), was the highest contributor to PM2.5 during late summer. Over the 4-year analysis, the RFO percent contribution to total PM2.5 declined. This is consistent with previous studies and may be attributed to regulations restricting the sulfur content of ship fuel. Biomass combustion emissions (BMC) and sea salt were the largest PM2.5 sources observed at CPO in winter, accounting for over 80% of the fine particulate. BMC accounted for a large percent of the fine particulate pollution when winds were easterly, or continental. Sea salt was the dominant winter factor when winds blew from the west. Measured trace carbon monoxide (CO) and reactive nitrogen species (NOy) were most strongly correlated with the BMC factor and continental winds. The fourth factor was identified as aged crustal material, or dust. In all three years, dust

peaked in the spring and was associated exclusively with north-easterly winds. The last factor was identified as aged sea salt mixed with nitrate, sulfate, and other components common to RFO and BMC source factors. It did not exhibit a strong seasonal cycle or dependence on wind direction.","container-title":"Atmospheric Environment","DOI":"10.1016/j.atmosenv.2017.08.030","ISSN":"1352-2310","journalAbbreviation":"Atmospheric Environment","language":"en","page":"298-308","source":"ScienceDirect","title":"Background PM2.5 source apportionment in the remote Northwestern United States","volume":"167","author":[{"family":"Hadley","given":"Odelle L."}],"issued":{"date-parts":[["2017",10,1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. A recent EPA source apportionment study, for example, found that over 85% of ambient $PM_{2.5}$ in Oakridge, OR and Klamath Falls, OR was from woodsmoke during the heating season [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lPHSDRTt","properties":{"formattedCitation":"(10)","plainCitation":"(10)","noteIndex":0},"citationItems":[{"id":23621,"uris":["http://zotero.org/groups/73355/items/TZ82RSII"],"itemData":{"id":23621,"type":"article-journal","abstract":"Wood smoke from residential wood combustion is a significant source of elevated PM2.5 in many communities across the Northwest U.S. Accurate representation of residential wood combustion in source-oriented regional scale air quality models is challenging because of multiple uncertainties. As an alternative to source-oriented source apportionment, this work provides, through receptor-oriented source apportionment, an assessment of winter residential wood combustion impacts at multiple Northwest U.S. locations. Source apportionment was performed on chemically speciated PM2.5 from 19 monitoring sites using the Positive Matrix Factorization (PMF) receptor model. Each site was modeled independently, but a common data preparation and modeling protocol was used so that results were as comparable as possible across sites. Model solutions had from 4 to 8 PMF factors, depending on the site. PMF factors at each site were associated with a source classification (e.g., primary wood smoke), a dominant chemical composition (e.g., ammonium nitrate), or were some mixture. 15 different sources or chemical compositions were identified as contributing to PM2.5 across the 19 sites. The 6 most common were; aged wood smoke and secondary organic carbon, motor vehicles, primary wood smoke, ammonium nitrate, ammonium sulfate, and fugitive dust. Wood smoke was identified at every site, with both aged and primary wood smoke identified at most sites. Wood smoke contributions to PM2.5 were averaged for the two winter months of December and January, the months when wood smoke in the Northwest U.S. is mainly from residential wood combustion. The total contribution of residential wood combustion, that from primary plus aged smoke, ranged from 11.4% to 92.7% of average December and January PM2.5 depending on the site, with the highest percent contributions occurring in smaller towns that have fewer expected sources of winter PM2.5. Receptor modeling at multiple sites, such as that conducted in this work, provided some significant advantages over modeling a single or small number of sites. Analysis at multiple sites allowed common factor chemical compositions to be identified, making it easier to evaluate when a PMF factor at a particular site represents a mix of sources versus a single source. The identification of similar PMF factors across multiple sites also allowed average chemical profiles to be established for the 6 the most commonly identified PM2.5 sources or compositions in this study. These average profiles have the potential to be used as source profile inputs in future Chemical Mass Balance receptor modeling, when a limited number of samples may restrict the ability to conduct PMF receptor modeling, or when the availability of local source profiles is limited. Receptor modeling results spanning a range of community sizes and source compositions, as in

this study, could be used to evaluate and improve the representation of wood smoke and other specific sources in source-oriented regional scale air quality models by providing an independent source impact assessment.","container-title":"Atmospheric Environment","DOI":"10.1016/j.atmosenv.2016.07.048","ISSN":"1352-2310","journalAbbreviation":"Atmospheric Environment","language":"en","page":"210-219","source":"ScienceDirect","title":"Source apportionment of PM2.5 at multiple Northwest U.S. sites: Assessing regional winter wood smoke impacts from residential wood combustion","title-short":"Source apportionment of PM2.5 at multiple Northwest U.S. sites","volume":"142","author":[{"family":"Kotchenruther","given":"Robert A."}],"issued":{"date-parts":[["2016",10,1]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. Woodstove heating is prevalent in our communities, and in addition to the ambient contributions, also poses substantial risks due to indoor air pollution. Personal exposure to $PM_{2.5}$ from residential wood heaters was found to be inversely correlated with income, disproportionately affecting low-income households [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NlvmMqLw","properties":{"formattedCitation":"(13,14)","plainCitation":"(13,14)","noteIndex":0},"citationItems":[{"id":9809,"uris":["http://zotero.org/groups/73355/items/L2TETK92"],"itemData":{"id":9809,"type":"article-journal","abstract":"Ambient particulate matter (PM) exposures have adverse impacts on public health, but research evaluating indoor PM concentrations in rural homes in the United States using wood as fuel for heating is limited. Our objectives were to characterize indoor PM mass and particle number concentrations (PNCs), quantify infiltration of outdoor PM into the indoor environment, and investigate potential predictors of concentrations and infiltration in 96 homes in the northwestern US and Alaska using wood stoves as the primary source of heating. During two forty-eight hour sampling periods during the pre-intervention winter of a randomized trial, we assessed PM mass (<2.5μm) and PNCs (particles/cm3) in six size fractions (0.30–0.49, 0.50–0.99, 1.00–2.49, 2.5–5.0, 5.0–10.0, 10.0+μm). Daily mean (sd) PM2.5 concentrations were 28.8 (28.5)μg/m3 during the first sampling period and 29.1 (30.1)μg/m3 during the second period. In repeated measures analyses, household income was inversely associated with PM2.5 and smaller size fraction PNCs, in particular. Time of day was a significant predictor of indoor and outdoor PM2.5 concentrations, and infiltration efficiency was relatively low (Finf (sd)=0.27 (0.20)). Our findings demonstrate relatively high mean PM concentrations in these wood burning homes and suggest potential targets for interventions for improving indoor air quality and health in rural settings.","container-title":"Environmental Research","DOI":"10.1016/j.envres.2015.02.005","ISSN":"0013-9351","journalAbbreviation":"Environmental Research","note":"PMID: 25701812\nPMCID: PMC4385435","page":"93-100","source":"ScienceDirect","title":"Indoor particulate matter in rural, wood stove heated homes","volume":"138","author":[{"family":"Semmens","given":"Erin O."},{"family":"Noonan","given":"Curtis W."},{"family":"Allen","given":"Ryan W."},{"family":"Weiler","given":"Emily C."},{"family":"Ward","given":"Tony J."}],"issued":{"date-parts":[["2015",4,1]]}}},{"id":23637,"uris":["http://zotero.org/groups/73355/items/6NZZRMTF"],"itemData":{"id":23637,"type":"article-journal","abstract":"Household heating using wood stoves is common practice in many rural areas of the\nUnited States (US) and can lead to elevated concentrations of indoor fine particulate\nmatter (PM2.5). We collected 6-day measures of indoor PM2.5 during the winter and\nevaluated household and stove-use characteristics in homes at three rural and diverse\nstudy sites. The median indoor PM2.5 concentration across all

homes was 19 µg/m3\n,\nwith higher concentrations in Alaska (median = 30, minimum = 4, maximum = 200,\nn = 10) and Navajo Nation homes (median = 29, minimum = 3, maximum = 105, n = 23)\ncompared with Montana homes (median = 16, minimum = 2, maximum = 139, n = 59).\nHouseholds that had not cleaned the chimney within the past year had 65% higher\ngeometric mean PM2.5 compared to those with chimney cleaned within 6 months\n(95% confidence interval [CI]: −1, 170). Based on a novel wood stove grading method,\nhomes with low-quality and medium-quality stoves had substantially higher PM2.5\ncompared to homes with higher-quality stoves (186% higher [95% CI: 32, 519] and\n161% higher; [95% CI:27, 434], respectively). Our findings highlight the need for, and\ncomplex nature of, regionally appropriate interventions to reduce indoor air pollution\nin rural wood-burning regions. Higher-quality stoves and behavioral practices such as\nregular chimney cleaning may help improve indoor air quality in such homes.","container-title":"Indoor Air","DOI":"10.1111/ina.12808","ISSN":"0905-6947","issue":"4","page":"1109-1124","title":"Indoor fine particulate matter and demographic, household, and wood stove characteristics among rural US homes heated with wood fuel","volume":"31","author":[{"family":"Walker","given":"Ethan S."},{"family":"Noonan","given":"Curtis W."},{"family":"Semmens","given":"Erin O."},{"family":"Ware","given":"Desirae"},{"family":"Smith","given":"Paul"},{"family":"Boyer","given":"Bert"},{"family":"Erdei","given":"Esther"},{"family":"Hopkins","given":"Scarlett E."},{"family":"Lewis","given":"Johnnye"},{"family":"Belcourt","given":"Annie"},{"family":"Ward","given":"Tony J."}],"issued":{"date-parts":[["2021",7]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}], and several studies have documented high indoor $PM_{2.5}$ concentrations among Native American communities reliant of wood heating [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"dqFW3IIt","properties":{"formattedCitation":"(15\\uc0\\u8211{}18)","plainCitation":"(15–18)","noteIndex":0},"citationItems":[{"id":23631,"uris":["http://zotero.org/groups/73355/items/F7FFMAY9"],"itemData":{"id":23631,"type":"article-journal","abstract":"Communities in the Navajo Nation face public health burdens caused in part by the combustion of wood and coal for indoor heating using stoves that are old or in disrepair. Wood and coal combustion emits particulate matter (PM) with aerodynamic diameter < 2.5 µm (PM2.5), which can reach deep in the lung and cause injuries. Currently, there is little information about the health effects of wood and coal combustion-derived PM2.5 on Navajo Nation residents. This study tested the hypothesis that PM2.5 generated from solid fuel combustion in stoves commonly used by Navajo residents would induce stratified oxidative stress responses ranging from activation of antioxidant defense to inflammation and cell death in mouse macrophages (RAW 264.7). PM2.5 emitted from burning Ponderosa Pine (PP) and Utah Juniper (UJ) wood and Black Mesa (BM) and Fruitland (FR) coal in a stove representative of those widely used by Navajo residents were collected, and their aqueous suspensions used for cellular exposure. PM from combustion of wood had significantly more elemental carbon (EC) (15%) and soluble Ni (0.0029%) than the samples from coal combustion (EC: 3%; Ni: 0.0019%) and was also a stronger activator of antioxidant enzyme heme oxygenase-1 (11-fold increase vs. control) than that from coal (5-fold increase). Only PM from PP-wood (12-fold) and BM-coal (3-fold) increased the release of inflammatory cytokine tumor necrosis factor alpha. Among all samples, PP-wood consistently had the strongest oxidative stress and inflammatory effects. PM components, i.e. low-volatility organic

carbon, EC, Cu, Ni and K were positively correlated with the cellular responses. Results showed that, at the concentrations tested, emissions from all fuels did not have significant cytotoxicity. These findings suggest that PM2.5 emitted from combustion of wood and coal commonly used by Navajo residents may negatively impact the health of this community.","container-title":"Atmospheric Environment","DOI":"https://doi.org/10.1016/j.atmosenv.2018.03.031","title":"Evaluation of cellular effects of fine particulate matter from combustion of solid fuels used for indoor heating on the Navajo Nation using a stratified oxidative stress response model","URL":"https://www.sciencedirect.com/science/article/pii/S1352231018301900?via%3Dihub","volume":"182","author":[{"family":"Li","given":"Ning"},{"family":"Champion","given":"Wyatt M"},{"family":"Imam","given":"Jemal"},{"family":"Sidhu","given":"Damansher"},{"family":"Salazar","given":"Joseph"},{"family":"Majestic","given":"Brian J."},{"family":"Montoya","given":"Lupita D."}],"accessed":{"date-parts":[["2022",2,24]]},"issued":{"date-parts":[["2018",6]]}}},{"id":12154,"uris":["http://zotero.org/groups/2412200/items/EHPC7VWX"],"itemData":{"id":12154,"type":"article-journal","container-title":"American Journal of Respiratory and Critical Care Medicine","DOI":"10.1164/rccm.201701-0238ED","ISSN":"1073-449x","issue":"12","language":"eng","page":"1552-1554","title":"Clean Fuels to Reduce Household Air Pollution and Improve Health. Still Hoping to Answer Why and How","volume":"195","author":[{"family":"Miele","given":"C. H."},{"family":"Checkley","given":"W."}],"issued":{"date-parts":[["2017",6,15]]}}},{"id":23640,"uris":["http://zotero.org/groups/73355/items/7FINA7GB"],"itemData":{"id":23640,"type":"article-journal","abstract":"Indoor and outdoor concentrations of PM2.5 were measured for 24 h during heating and non-heating seasons in a rural solid fuel burning Native American community. Household building characteristics were collected during the initial home sampling\nvisit using technician walkthrough questionnaires, and behavioral factors were collected through questionnaires by interviewers. To identify seasonal behavioral factors and household characteristics associated with indoor PM2.5, data were analyzed separately by heating and non-heating seasons using multivariable regression. Concentrations of PM2.5 were significantly higher during the heating season (indoor: 36.2 μg/m3 ; outdoor: 22.1 μg/m3) compared with the non-heating season (indoor: 14.6 μg/m3 ; outdoor: 9.3 μg/m3). Heating season indoor PM2.5 was strongly associated with heating fuel type, housing type, indoor pests, use of a climate control unit, number of interior doors, and indoor relative humidity. During the non-heating season, different behavioral and household characteristics were associated with indoor PM2.5 concentrations (indoor smoking and/or burning incense, opening doors and windows, area of surrounding environment, building size and height, and outdoor PM2.5). Homes heated with coal and/or wood, or a combination of coal and/or wood with electricity and/or natural gas had elevated indoor PM2.5 concentrations that exceeded both the EPA ambient standard (35 μg/m3) and the WHO guideline (25 μg/m3).","container-title":"Indoor Air","DOI":"10.1111/ina.12904","issue":"6","page":"2008-2019","title":"Household and behavioral determinants of indoor PM2.5 in a rural solid fuel burning Native American community","volume":"31","author":[{"family":"Hadeed","given":"Steven J."},{"family":"O'Rouke","given":"Mary Kay"},{"family":"Canales","given":"Robert A."},{"family":"Joshweseoma","given":"Lorencita"},{"family":"Sehongva","given":"Gregory"},{"family":"Paukgana","given":"Morris"},{"family":"Gonzalez-

Figueroa","given":"Emmanuel"},{"family":"Alshammari","given":"Modhi"},{"family":"Burgess","given":"Jeffery L."},{"family":"Harris","given":"Robin B."}],"issued":{"date-parts":[["2021"]]}},{"id":23634,"uris":["http://zotero.org/groups/73355/items/C3JP5TPF"],"itemData":{"id":23634,"type":"article-journal","abstract":"BACKGROUND: Indoor air pollution is associated with adverse health effects; however, few studies exist studying indoor airpollution on the Navajo Nation in the southwest U.S., a community with high rates of respiratory disease.\nMETHODS: Indoor PM2.5 concentration was evaluated in 26 homes on the Navajo Nation using real-time PM2.5 monitors.\nHousehold risk factors and daily activities were evaluated with three metrics of indoor PM2.5: time-weighted average (TWA), 90th\npercentile of concentration, and daily minutes exceeding 100 μg/m3. A questionnaire and recall sheet were used to record baseline\nhousehold characteristics and daily activities.\nRESULTS: The median TWA, 90th percentile, and daily minutes exceeding 100 μg/m3 were 7.9 μg/m3, 14.0 μg/m3, and 17 min,\nrespectively. TWAs tended to be higher in autumn and in houses that used fuel the previous day. Other characteristics associated\nwith elevated PM exposure in all metrics included overcrowded houses, nonmobile houses, and houses with current smokers, pets,\nand longer cooking time.\nCONCLUSIONS: Some residents of the Navajo Nation have higher risk of exposure to indoor air pollution by Environmental\nProtection Agency (EPA) standards. Efforts to identify the causes and associations with adverse health effects are needed to ensure\nthat exposure to risks and possible health impacts are mitigated","container-title":"Exposure Science & Enviromental Epidemiology","ISSN":"1559-0631","title":"Evaluation of indoor PM2.5 concentrations in a Native American Community: a pilot study","volume":"116","author":[{"family":"Ji","given":"Nan"},{"family":"Rule","given":"Ana M."},{"family":"Weatherholtz","given":"Robert"},{"family":"Crosby","given":"Lynn"},{"family":"Bunnerl","given":"Joseph E."},{"family":"Orem","given":"Bill"},{"family":"Reid","given":"Raymond"},{"family":"Santosham","given":"Mathuram"},{"family":"Hammitt","given":"Laura L."},{"family":"O'Brien","given":"Katherine L."}],"issued":{"date-parts":[["2021"]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}].

Our approach is informed by three main components research indicates is key for successful application of air monitoring networks for improving community response. First, the data needs to be of sufficient quality and granularity (in time and geography) to inform decisions. Second, people are more likely to take action if the data is coming from a trusted source. Third, the information needs to be accompanied by actionable steps [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"G20EofEb","properties":{"formattedCitation":"(19\\uc0\\u8211{}21)","plainCitation":"(19–21)","noteIndex":0},"citationItems":[{"id":23716,"uris":["http://zotero.org/groups/73355/items/BDQVHM7C"],"itemData":{"id":23716,"type":"article-journal","abstract":"Communicating effectively and efficiently on air quality and its health impacts is an important but difficult and complex task. It requires careful consideration of the audience one wants to reach, the messages one is trying to present, the venue through which the message will be delivered. The audience, context, technique, and content factors may affect how well it is heard and how appropriately it is interpreted. In this short paper, I describe many of these concerns and provide some suggestions for how best to address them. However, since every audience differs in goals, characteristics, and

nature, what is most important is implementing an effective communications program. This program should include frequent two-way communication, repeated and on-going evaluation of how well the audience understands the messages, and consideration of how to improve the delivery.","container-title":"Air Quality, Atmosphere & Health","DOI":"10.1007/s11869-009-0046-y","ISSN":"1873-9326","issue":"4","journalAbbreviation":"Air Qual Atmos Health","language":"en","page":"207-221","source":"Springer Link","title":"Some considerations for the communication of results of air pollution health effects tracking","volume":"2","author":[{"family":"Wartenberg","given":"Daniel"}],"issued":{"date-parts":[["2009",12,1]]}}},{"id":23714,"uris":["http://zotero.org/groups/73355/items/FJ7RKV7T"],"itemData":{"id":23714,"type":"article-journal","abstract":"Solutions that engage the public are needed to tackle air pollution. Technological approaches are insufficient to bring urban air quality to recommended target levels, and miss out on opportunities to promote health more holistically through behavioural solutions, such as active travel. Behaviour change is not straightforward, however, and is more likely to be achieved when communication campaigns are based on established theory and evidence-based practices. We systematically reviewed the academic literature on air pollution communication campaigns aimed at influencing air pollution-related behaviour. Based on these findings, we developed an evidence-based framework for stimulating behaviour change through engagement. Across the 37 studies selected for analyses, we identified 28 different behaviours assessed using a variety of designs including natural and research-manipulated experiments, cross-sectional and longitudinal surveys and focus groups. While avoidance behaviour (e.g. reducing outdoor activity) followed by contributing behaviours (e.g. reducing idling) were by far the most commonly studied, supporting behaviour (e.g. civil engagement) shows promising results, with the added benefit that supporting local and national policies may eventually lead to the removal of social and physical barriers that prevent wider behavioural changes. Providing a range of actionable information will reduce disengagement due to feelings of powerlessness. Targeted localized information will appear more immediate and engaging, and positive framing will prevent cognitive dissonance whereby people rationalize their behaviour to avoid living with feelings of unease. Communicating the co-benefits of action may persuade individuals with different drivers but as an effective solution, it remains to be explored. Generally, finding ways to connect with people's emotions, including activating social norms and identities and creating a sense of collective responsibility, provide promising yet under-explored directions. Smartphones provide unique opportunities that enable flexible and targeted engagement, but care must be taken to avoid transferring responsibility for action from national and local authorities onto individuals. Multidisciplinary teams involving artists, members of the public, community and pressure groups, policy makers, researchers, and businesses, are needed to co-create the stories and tools that can lead to effective action to tackle air pollution through behavioural solutions.","container-title":"Sustainability Science","DOI":"10.1007/s11625-021-01038-2","ISSN":"1862-4057","issue":"6","journalAbbreviation":"Sustain Sci","language":"en","page":"2027-2047","source":"Springer Link","title":"How do we effectively communicate air pollution to change public attitudes and behaviours? A review","title-short":"How do we effectively communicate air pollution to change public attitudes and behaviours?","volume":"16","author":[{"family":"Riley","given":"Rosie"},{"family":"Preux","given":"Laure","non-dropping-particle":"de"},{"family":"Capella","given":"Peter"},{"family":"Mejia","given":"Cristian"},{"family":"Kajikawa","given":"Yuya"},{"family":"Nazelle","given":"Audrey","non-dropping-particle":"de"}],"issued":{"date-

parts":[["2021",11,1]]}}},{"id":23711,"uris":["http://zotero.org/groups/73355/items/UC2EHUZT"],"itemData":{"id":23711,"type":"article-journal","abstract":"Accurate, timely information can be a powerful tool to mitigate harmful effects of air pollution. While national guidelines for environmental risk communication – based on risk and crisis communication principles – exist, little is known how these are operationalized, nor about the effectiveness of existing communication efforts. Moreover, a growing literature on environmental health literacy suggests that communication about environmental risks must move beyond individual behavior education to empower communities to mobilize to reduce environmental threats. This study aimed to identify and critically evaluate public sources of information about the causes and controllability of air pollution and its health effects, and potential disparities in information reach and utility. The case study triangulated data from three sources: Systematic analysis of the public information environment, interviews with regional expert stakeholders, and interviews with community residents. Three themes emerged: 1) Lack of clarity about responsibility for communicating about air quality (information sources), 2) Existing air quality communication strategies lack critical information including risk mitigation behaviors and long-term health impacts (information quality), and 3) Existing air quality communications fail to reach vulnerable populations (information reach). This study demonstrates that air quality communication is lacking yet crucially needed. Information about air pollution and health risks focuses on individual risk behaviors but is disseminated using channels that are unlikely to reach the most vulnerable populations. We discuss opportunities to improve the reach and impact of communication of air quality health risks, an increasingly important global priority, situating our argument within a critical environmental health literacy perspective.","container-title":"Journal of Health Communication","DOI":"10.1080/10810730.2019.1574320","ISSN":"1081-0730","issue":"1","note":"publisher: Taylor & Francis\n_eprint: https://doi.org/10.1080/10810730.2019.1574320\nPMID: 30730281","page":"75-83","source":"Taylor and Francis+NEJM","title":"Public Awareness of Air Pollution and Health Threats: Challenges and Opportunities for Communication Strategies To Improve Environmental Health Literacy","title-short":"Public Awareness of Air Pollution and Health Threats","volume":"24","author":[{"family":"Ramírez","given":"A Susana"},{"family":"Ramondt","given":"Steven"},{"family":"Van Bogart","given":"Karina"},{"family":"Perez-Zuniga","given":"Raquel"}],"issued":{"date-parts":[["2019",1,2]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. Our project explicitly addresses these three components by providing high quality and granular data to the community, which will be generated a trusted community source (CTCLUSI's monitoring network), and will be accompanied by outreach and educational materials to help our members and the community make informed decisions to reduce their exposures and protect public health.

Current CTCLUSI Air Monitoring Capacities

The CTCLUSI has an Air Quality Program that is funded through the EPA which works to identify, minimize, and eliminate negative impacts that can be linked to the exposure of poor air quality in an overall effort to protect and improve the health of the Tribal membership and the Tribal environment. Currently, the Air Quality Program has two employees assigned to monitor, research and assess indoor and ambient air quality, set air quality priorities, provide advice and expertise on air quality health impacts to Tribal government staff and Tribal community, and assess the impact of local and state laws, executive actions, and permits on the Tribe's air resources.

The Tribe has two ambient air monitoring sites, both located near the CTCLUSI administrative offices in Coos Bay. Our air program monitors meteorological conditions and particulate matter on Tribal land in Coos Bay and at indoor locations, including administration offices and ceremonial events. The department of Natural Resources (DNR) reviews Title V permits, participates in public comments and consultation on Clean Air Act regulatory changes, state and federal carbon dioxide and climate change legislation and rulemaking, and wildfire-related air quality concerns. DNR air program staff produces outreach materials for Tribal members regarding issues and exposures related to indoor air quality, outdoor air quality, and prohibitive burning.

Community Partnerships

Oregon Department of Environmental Quality (ODEQ):

- We have the shared goal of creating a program that engages communities in air quality monitoring and provides a roadmap to turn data into actions to improve local air quality.
- DEQ is going to review our design and deployment steps, and provide technical assistance on both the development of monitoring sites and the processing of data.
- Staff hours on this project will allow CTCLUSI to engage with ODEQ's community driven monitoring and outreach efforts, and make the Tribe's voice heard in Oregon air quality policy. We want to contribute to ODEQ's community monitoring advisory group.

Lane Regional Air Protection Agency (LRAPA):

- The agency plays an active role in community development and planning.
- Will be able to offer advice and assistance on the design, placement of the air monitoring stations, and has offered to act as a reference site or co-locate an air monitor.
- Has expertise in monitoring and regulating air quality in Lane County, OR.

School Districts:

- The role of school districts is to act as a hub for community outreach and education.
- Have expertise in developing educational curriculum.
- Will benefit from the project by having access to the real-time air quality data of their location and community airborne hazard early warning system, with specific air quality educational opportunities for their students.

Institute for Tribal Environmental Professionals & The Tribal Air Monitoring Support Center (ITEP/TAMS):

- Activities will include assisting with developing a data management plan and any data issues that arise during the project, and aiding in the development of air quality educational curriculum.
- Have expertise on and provide resources for air quality data management and air quality curriculum.
- They will benefit by increasing the effectiveness, reputation, and credibility of their educational programs.

Community Engagement

Needs Assessment on Critical Air Quality Issues

In order to develop an action plan, we will conduct a needs assessment through surveys of Tribal members and focused meetings with our community partners. We will use the results to make recommendations from concerns arising from the surveys and community outreach. This will result in an action plan with both a comprehensive outline of the community's hazards and concerns and a response strategy to implement recommendations.

Engagement and Participation

We have strong community ties, evidenced by the several letters from organizations and government entities which express enthusiasm for this project and have pledged practical means of support. This community participation aligns with the EPA's goals, and is strengthened through current collaborations with EPA Region 10 Tribal Air Team. Additionally, we will be working closely with the CTCLUSI Tribal Council through regular meetings in regards to the air quality needs of Tribal members. The Tribe will engage in community participation and provide direct access to air quality data and how to improve health.

This effort will also build upon existing partnerships with Oregon State University funded by two federal grants, including the US EPA People, Profit, Planet (P3) Program (EPA-G2021-P3-Q1) – Air Quality and the US Department of Energy Biomass Energy Technologies Office. Both collaborations are focused on needs assessment and technological design for cleaner household heating in the CTCLUSI and other Tribal communities in the Pacific Northwest. Activities associated with these 1-4-year projects seek to better understand the needs, resources, and practices around household heating using biomass fuels through detailed data gathering with the community and use these results to design interventions in the form of improved heat transfer efficiency for cordwood heaters, stove retrofits or changeouts, and/or behavior change campaigns aimed at improving economic, environmental, and health outcomes. Indoor air quality monitoring paired with stack emissions measurements will represent a significant aspect of these projects and tie in seamlessly with the indoor and outdoor air quality work and educational aspects proposed here. Community capacity building and regional collaboration are significant aspects of both projects which will also be leveraged.

Collaboration with Schools

The CTCLUSI Air program staff will work closely with community organizations to provide education about the air quality health issues and our monitoring network. We will be establishing an educational curriculum with ITEP and local educators to use with the monitoring sites at the various school districts. Schools enhance our outreach program through conducting demonstration monitoring events and teaching hands-on science lessons to the students. Curricular materials and teacher training will be developed and offered in conjunction with Dr. Cory Buxton at OSU through his National Science Foundation-sponsored "Language, Culture, and Knowledge-building through Science " (LaCuKnoS) program. LaCuKnoS uses a model of curriculum development and teacher professional learning that highlights three interrelated strands for supporting students' developing abilities to apply their emerging scientific knowledge to community-based social challenges: language development for science sense making; mapping cultural and community connections to science; and knowledge building for informed decision making. Teachers from across Oregon, who participate in the Science and Mathematics Investigative Learning Experiences (SMILE) project serve as a testbed for piloting these materials.

Distributing Supplies and Monitoring Equipment

As part of our outreach activities, we will offer Tribal members interested in monitoring air quality with a set of materials for installing equipment at their homes. We anticipate these support materials will include the instrumentation (PurpleAir sensors), pictorial installation guides and video tutorials, and guidance on how to access the CTCLUSI air quality dashboard. We will also offer direct, in-person support for installation. These materials will also be accompanied by community demonstrations that will teach how to interpret the data, and what steps to take to reduce exposure. The ambient air quality data will be made available online for the community.

Members will also be offered HEPA filtration units for use during high particulate events (wildfire and heating smoke) and carbon monoxide alarms for basic household safety. Although Oregon requires homes to have CO monitors, many homes do not have these devices up to date, particularly in older homes and underserved communities. We will aim to provide this monitoring program for up to 75 households.

Environmental Justice and Underserved Communities

The historical treatment of the CTCLUSI (documented in the project significance section) has led to a situation common to Tribal communities, in which we are subject to disproportionate and adverse health outcomes caused by air pollutants, and now being exacerbated by the COVID-19 pandemic [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"9dT1M9Mu","properties":{"formattedCitation":"(22,23)","plainCitation":"(22,23)","noteIndex":0},"citationItems":[{"id":23697,"uris":["http://zotero.org/groups/73355/items/RCFZQW3N"],"itemData":{"id":23697,"type":"article-journal","abstract":"Economic and social marginalization among American Indians and Alaska Natives (AI/ANs) results in higher chronic disease prevalence. Potential causal associations between toxic environmental exposures and adverse health outcomes within AI/AN communities are not well understood.","container-title":"Journal of Racial and Ethnic Health Disparities","DOI":"10.1007/s40615-020-00700-2","ISSN":"2196-8837","issue":"4","journalAbbreviation":"J. Racial and Ethnic Health Disparities","language":"en","page":"698-739","source":"Springer Link","title":"A Systematic Review of Environmental Health Outcomes in Selected American Indian and Alaska Native Populations","volume":"7","author":[{"family":"Meltzer","given":"Gabriella Y."},{"family":"Watkins","given":"Beverly-Xaviera"},{"family":"Vieira","given":"Dorice"},{"family":"Zelikoff","given":"Judith T."},{"family":"Boden-Albala","given":"Bernadette"}],"issued":{"date-parts":[["2020",8,1]]}}},{"id":18532,"uris":["http://zotero.org/groups/73355/items/8NIEG4Y5"],"itemData":{"id":18532,"type":"article-journal","abstract":"This report describes COVID-19-associated mortality among American Indian and Alaska Native persons compared with non-Hispanic White persons.","container-title":"MMWR. Morbidity and Mortality Weekly Report","DOI":"10.15585/mmwr.mm6949a3","ISSN":"0149-21951545-861X","journalAbbreviation":"MMWR Morb Mortal Wkly Rep","language":"en-us","source":"www.cdc.gov","title":"COVID-19 Mortality Among American Indian and Alaska Native Persons — 14 States, January–June 2020","URL":"https://www.cdc.gov/mmwr/volumes/69/wr/mm6949a3.htm","volume":"69","author":[{"family":"Arrazola","given":"Jessica"}],"accessed":{"date-parts":[["2021",3,18]]},"issued":{"date-parts":[["2020"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. With upcoming revisions to the EPA's particulate matter National Ambient Air Quality Standards (NAAQS) and Coos Bay now marked as a disadvantaged community on the EPA's Environmental Justice (EJ) screening tool, it will be vital for community members to be prepared to address airborne health hazards in their own homes. Many CTCLUSI Tribal homes rely on wood heating, do not have functioning carbon monoxide monitors, and/or have poor ventilation and inadequate weather-proofing.

Coos Bay is in the 63rd percentile in the State for $PM_{2.5}$ EJ Index, the 66th percentile for the 2017 Air Toxics Cancer Risk EJ Index and Air Toxics Respiratory Health Index. In 2018, the annual level of $PM_{2.5}$ in Coos County was 9.0$\mu g/m^3$ (national standard for annual $PM_{2.5}$ levels is

12.0μg/m^3). In Coos County 11.1% of adults have asthma vs. 7.0% National, and 6.9% of children vs. 8.3%. Our region is also highly impacted by wildfires, which are expected to become more frequent and intense in our area [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"D6u7ajmT","properties":{"formattedCitation":"(4)","plainCitation":"(4)","noteIndex":0},"citationItems":[{"id":19781,"uris":["http://zotero.org/groups/73355/items/UVC79WFA"],"itemData":{"id":19781,"type":"article-journal","abstract":"Recent dramatic and deadly increases in global wildfire activity have increased attention on the causes of wildfires, their consequences, and how risk from wildfire might be mitigated. Here we bring together data on the changing risk and societal burden of wildfire in the United States. We estimate that nearly 50 million homes are currently in the wildland–urban interface in the United States, a number increasing by 1 million houses every 3 y. To illustrate how changes in wildfire activity might affect air pollution and related health outcomes, and how these linkages might guide future science and policy, we develop a statistical model that relates satellite-based fire and smoke data to information from pollution monitoring stations. Using the model, we estimate that wildfires have accounted for up to 25% of PM2.5 (particulate matter with diameter <2.5 μm) in recent years across the United States, and up to half in some Western regions, with spatial patterns in ambient smoke exposure that do not follow traditional socioeconomic pollution exposure gradients. We combine the model with stylized scenarios to show that fuel management interventions could have large health benefits and that future health impacts from climate-change–induced wildfire smoke could approach projected overall increases in temperature-related mortality from climate change—but that both estimates remain uncertain. We use model results to highlight important areas for future research and to draw lessons for policy.","container-title":"Proceedings of the National Academy of Sciences","DOI":"10.1073/pnas.2011048118","ISSN":"0027-8424, 1091-6490","issue":"2","journalAbbreviation":"PNAS","language":"en","note":"publisher: National Academy of Sciences\nsection: Perspective\nPMID: 33431571","source":"www.pnas.org","title":"The changing risk and burden of wildfire in the United States","URL":"https://www.pnas.org/content/118/2/e2011048118","volume":"118","author":[{"family":"Burke","given":"Marshall"},{"family":"Driscoll","given":"Anne"},{"family":"Heft-Neal","given":"Sam"},{"family":"Xue","given":"Jiani"},{"family":"Burney","given":"Jennifer"},{"family":"Wara","given":"Michael"}],"accessed":{"date-parts":[["2021",8,7]]},"issued":{"date-parts":[["2021"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. During the 2020 wildfires in Oregon, for example, reference monitor stations recorded peak one-hour concentrations in the coastal Tribal area neared 1,000 μg/m^3, and daily averages ranged from approximately 30-400μg/m^3.[1]

Expected Project Outputs and Outcomes

Our project will provide several important outcomes. First, the low-cost ambient network at these homes and community spaces will provide more granular data for Tribal members and the broader community population. Second, the impact of wood heating on outdoor and indoor air quality will be made explicit, helping community members make informed decisions on heating practices and technologies. Third, members will be provided with guidance on actionable measures to reduce exposures (e.g. staying indoors and closing doors and windows during wildfire events, use of HEPA purifiers, using dry wood, switching to cleaner heating technologies, etc.). Overall,

[1] https://oraqi.deq.state.or.us/report/MonitorReport

we anticipate deployment of air quality monitors, combined with CO monitors and air purifiers to Tribal members' homes, will enable independence, knowledge of pollutant sources, and allow community members to monitor and act on information to mitigate exposure risk.

Conduct a Needs Assessment

The needs assessment will consist of the following outputs:

- Interview and survey material will be developed
- Partners will be interviewed and Tribal members surveyed, and the results collected
- An action plan published highlighting community needs and concerns, and how this program will be responsive to those needs

Deploy Monitoring Equipment

The following Tribal facilities have been identified as locations for ambient air monitoring:

- Tribal Housing (Qaxas) in Coos Bay
- Three Rivers Casino in Coos Bay
- Three Rivers Casino in Florence
- Outreach Office in Florence
- Outreach Office in Eugene
- One monitor at a school in Tribal counties (Coos, Curry, Douglas, Lane and Lincoln)

CTCLUSI has also recently been provided with a beta-attenuation monitor (a BAM-1022 from Met One) from another funding source. We will leverage this resource by co-locating PurpleAir monitors with the BAM-1022 to provide region and temporal-specific calibration factors for our low-cost monitoring network. Additionally, we will distribute carbon monoxide detectors and air filtration systems to Tribal members.

Inform Members on Impacts of Woodsmoke

Piggybacking on CTCLUSI's EPA and DoE funded work Oregon State University, we will encourage members with different types of heating devices in the home (e.g. old wood stoves, EPA 2020 compliant wood stoves, gas furnace, electric, etc.) to take part in the program. Installation guidance for those with wood heating stoves will include placement of the PurpleAir sensors, which can also track stove use patterns by running the sensor's temperature data stream through simple algorithms – an approach successfully applied by the OSU team for other projects [ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"wXRBquGD","properties":{"formattedCitation":"(24,25)","plainCitation":"(24,25)","noteIndex":0},"citationItems":[{"id":9035,"uris":["http://zotero.org/groups/73355/items/QVEPTYMC"],"itemData":{"id":9035,"type":"thesis","event-place":"Corvallis, OR","genre":"Masters Thesis","publisher":"Oregon State University","publisher-place":"Corvallis, OR","title":"Design and testing of the FUEL monitoring system: integrating engineering and ethnographic methods in global development efforts","author":[{"family":"Ventrella","given":"Jennifer"}],"issued":{"date-parts":[["2019"]]}}},{"id":15665,"uris":["http://zotero.org/groups/73355/items/LAKW9J6J"],"itemData":{"id":15665,"type":"article-journal","abstract":"Quantifying the impact of improved stoves and fuels designed to combat the health and environmental burdens of traditional cooking is necessary to ensure sustainable outcomes but remains challenging for practitioners. The current standard method to determine household fuel consumption, the Kitchen Performance Test, is costly, time intensive, and subject to error. To address these challenges, the Fuel Use Electronic Logger (FUEL), a sensor-based system that monitors fuel consumption in households was developed. In this study, the accuracy, granularity, and cost of FUEL were compared to that of the

standard Kitchen Performance Test through simultaneous testing. Monitoring was conducted over four and five consecutive days in 10 households in Burkina Faso that were each stacking LPG, charcoal, and wood stoves; and in 20 households in Uganda stacking multiple wood stoves, respectively. Results show good agreement between the two methods on an aggregate level, with an overall R2 value of 0.81, and more varied agreement when comparing fuel consumption on a day-to-day basis. The sample variation was found to generally decrease with increasing monitoring length, pointing to value in monitoring over longer durations afforded by the FUEL. There was no systematic over- or under-prediction of fuel consumption between FUEL and the KPT, suggesting that the FUEL method does not have significant bias relative to the KPT, but the accuracy of the methods relative to the true, "ground truth" household fuel consumption value was not known. There was no agreement between either method with self-reported survey data, further illustrating the unreliability of quantitative survey data. Moisture content and Standard Adult Equivalence measurements were found to be similar whether measurements were taken only on the first and last days of the study period as compared to each day, although this should be evaluated over a longer time period for future studies. Potential errors in each method are discussed and resulting suggestions for developing an effective study with the FUEL system are presented. An economic analysis shows that the FUEL system becomes increasingly economical as monitoring duration increases or new studies are conducted, with a breakeven point at 40 days in this case. Overall, these results point to the viability of the FUEL system to quantify long-term, in-situ fuel consumption with similar accuracy to current methods and the capability for more granular data over longer time periods with less intrusion into households.","container-title":"Development Engineering","DOI":"10.1016/j.deveng.2020.100047","ISSN":"2352-7285","journalAbbreviation":"Development Engineering","language":"en","page":"100047","source":"ScienceDirect","title":"Techno-economic comparison of the FUEL sensor and Kitchen Performance Test to quantify household fuel consumption with multiple cookstoves and fuels","volume":"5","author":[{"family":"Ventrella","given":"Jennifer"},{"family":"Lefebvre","given":"Olivier"},{"family":"MacCarty","given":"Nordica"}],"issued":{"date-parts":[["2020",1,1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}]. The indoor air quality and stove use data will be sent to a community web-based dashboard where the data would be aggregated and anonymized for privacy, and aimed at helping to identify trends in air quality associated with heating technologies, which in turn can be used to inform decisions on heating energy solutions.

Support School Curriculum and Outreach Program

Curricular materials and teacher trainings will be developed and offered in conjunction with existing work by Dr. Cory Buxton through his National Science Foundation-sponsored "Language, Culture, and Knowledge-building through Science" (LaCuKnoS) program ([HYPERLINK "https://lacuknos.oregonstate.edu/home" \h]). Curriculum materials can also be piloted through Oregon State's Science and Math Investigative Learning Experience (SMILE) program ([HYPERLINK "https://smile.oregonstate.edu/" \h]). These programs have a history of supporting educators and multilingual learners in Oregon's rural K-12 classrooms to pursue and succeed in STEM academic and occupational pathways. This is a voluntary service that will enhance CTCLUSI Air program.

Performance Measures and Plan

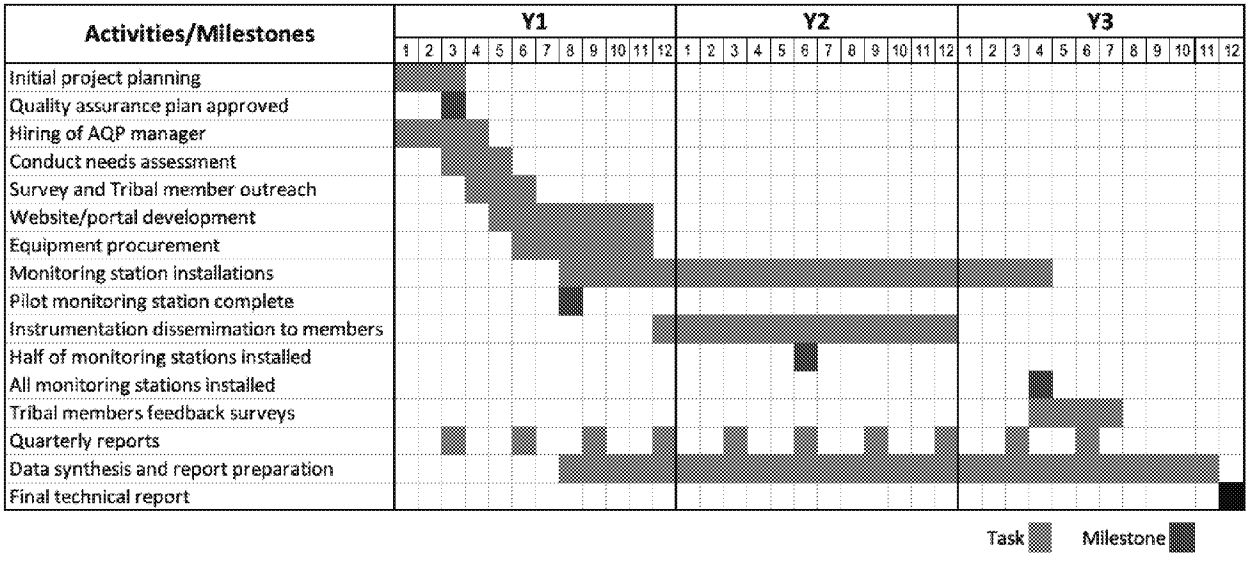
The objectives of this grant will be incorporated into the Department of Natural Resource's EPA Performance Partnership Grant (PPG) under the air program. Progress reports will be produced on

a quarterly basis and submitted to the EPA. Success stories will be shared on the Tribal website and in the monthly newsletter. Measurements of success include:

- Overseeing subrecipients, and/or contractors and vendors
- Tracking and reporting project progress on expenditures and purchases
- Tracking, measuring, and reporting accomplishments and proposed timelines/milestones.
- Number of sensors deployed and reporting on usage
- Tracking and reporting on the number of visitors to our website and the data portal
- Survey results based on feedback from users of the air quality instrumentation equipment (via Google Form)
- Number of students and classrooms reached

Timeline and Milestones

The following Gantt chart summarizes our tasks and milestones over the course of the project in support of our stated goals.



Quality Assurance Statement (see uploaded attachment)

Scaling and sustainability

All of the activities will be conducted with a long-term vision of scaling and sustainability. Specifically, materials developed for installing/maintaining equipment, education and outreach will all be user-friendly and well-documented, including video tutorials when appropriate. The Quality Assurance Project Plan will cover the necessary protocols and QA/QC processes, further institutionalizing the data collection and processing procedures. We will also be primarily relying on instrumentation (PurpleAirs) which is readily available, widely used, easy to swap out, and well-designed for simple integration into dashboards. Finally, we will make all of our materials publicly available through our website and share our learnings through reports, workshops and other avenues to help other tribal and EJ communities aiming to enhance their air monitoring work.

Past Performance

The Tribe has a proven fiscal management record that includes ongoing management of approximately $14 million in federal grant funded programs each year. The Tribe contracts with an independent Auditor to conduct a review and evaluation of the financial statement and business

activities of the Tribe each year. This "Independent Audit" is conducted in accordance with Government Auditing Standards issued by the Comptroller of the United States. The most recent audit found "no material weakness" or "significant deficiencies." Finally, the audit findings, determined the Tribe qualified as a "low risk auditee" based on the strength of their internal monitoring and compliance process and systems. The Tribe has approved procurement policies and procedures which are consistently applied, monitored, and evaluated. In addition, the Tribe has approved personnel policies and procedures which are reviewed and updated regularly to ensure they remain in compliance with Tribal and federal employment laws and regulations, and are consistently applied. The Finance Department utilizes MIP Fund Accounting Software to manage the Tribes' fund accounting system. In addition, the CTCLUSI utilizes a purchase order system that is designed to ensure all expenditures are authorized, allowable, and appropriate. All these systems are subject to review and monitoring from outside auditors, as part of the annual financial audit process.

In the last three years, the Tribe has successfully completed a number of grant -funded projects of similar size, scale, and scope including but not limited to: ANA Environmental Regulatory Enhancement Grant ($895,953), NOAA- Pacific Coast Salmon Recovery Fund Grants ($567,246), EPA- Performance Partnership Grants ($1,441,238).

Reporting Requirements

We have a track record of consistently and timely reporting on our projects. This includes all reporting requirements for the ANA Environmental Regulatory Enhancement Grant, NOAA Pacific Coast Salmon Recovery Fund Grants, and our EPA Performance Partnership Grants.

Staff Expertise (resumes attached):

The project will be managed by the DNR Director, **Dr. Roselynn Lwenya** who has her Doctorate degree in Environmental Studies and more than 20 years of experience in resource protection and organizational management. The Director will implement administrative rules, procedures, and program priorities consistent with policies established by the tribe.

Carter Thomas, Air Protection Specialist, will assist in the creation of QAPP and implementation of the Air Monitoring project. Carter has a degree in political science and is currently pursuing his graduate degree in Public Administration. Carter has been with the Tribe for three years.

Ali Grove, Air Protection Specialist will assist in coordinating collaborative partners, developing monitoring protocols, and community outreach and education.

Air Monitoring Project Manager: (attached job description)

Eriq Acosta has been an Education Specialist II for the Tribe since August 2019. He is responsible for curriculum instruction development and implementation both inside and out of the classroom. He specializes in using the Outdoor Experiential Education Model. Furthermore, he is responsible for building and implementing the Tribe's youth support program. For this grant, Eriq will provide support in outreach and education also provides grant support for CTCLUSI.

Mark Petrie, Tobacco Prevention & Education Program Coordinator has worked as the CTCLUSI Tobacco Prevention Grant Coordinator for over 5 years. He previously served as an elected Tribal Council member and was appointed Vice-Chair for his time in office. Mark will assist with administering of the Tribal community surveys and Education and outreach.

External collaborators include Oregon State University and Berkeley Air Monitoring Group. Dr. Nordica MacCarty, Associate Professor of Mechanical Engineering and Richard & Gretchen

Evans Scholar of Humanitarian Engineering at OSU is PI on two grants from the US EPA and US DOE focused on needs assessment, intervention design, and impact monitoring of cleaner burning wood heating stoves for tribal communities and will contribute to all three objectives. OSU's Dr. Cory Buxton, Professor of Education, will collaborate on our education goals (Goal 3). Dr. Michael Johnson from Berkeley Air Monitoring Group will also assist the CTCLUSI.

Detailed Budget

The project calls for the Director of Culture and Natural Resources to provide project and budget oversight. While the time commitment is likely to exceed the budget allocation, for purposes of determining the match, 0.1 FTE of the Director's time has been included in the project budget. Wages for time allocated to this project will be paid through the Tribe's General Fund and/or BIA Self-Governance funding and therefore are eligible as match.

Air Monitoring Project Manager (New Position): The project calls for the Air Monitoring Project Manager to work as 1 FTE employee on this project. 1 FTE of the position will be paid for through this grant. The first year and second year of the project reflects a 12month/per year per project period thus accounting for 2080 hours/year with a total of 4160 hours of staff time for two years. Year 3 will be paid through the BIA Self-Governance funds.
Total Budget: Salary and Fringe: Year 1&Year 2 ARP Total request: $124,800.

Air Protection Specialist (position 1): The project calls for the Air Protection Specialist to work as 1 FTE employee on this project. 0.30 FTE of the position will be paid for through this grant while 0.70 FTE of the position will be paid through EPA Performance Partnership Program which qualify as matching funds. The first year and second year of the project reflects a 6-month/per year per project period thus accounting for 624 hours/year with a total of 1248 hours of staff time for two years. Year 3 will be paid through the BIA Self-Governance funds. **Total Budget: Salary and Fringe: Year 1& Year 2 ARP Request: Total: $31,200**

Air Protection Specialist (position 2): The project calls for the Air Protection Specialist to work as 1 FTE employee on this project. 0.50 FTE of the position will be paid for through this grant while 0.50 FTE of the position will be paid through EPA Performance Partnership Program which qualify as matching funds. The first year and second year of the project reflects a 6-month/per year per project period thus accounting for 416 hours/year with a total of 838 hours of staff time for two years. Year 3 will be paid through the BIA Self-Governance funds. **Total Budget: Salary and Fringe: Year 1&Year 2 ARP Request: Total: $18,890**

TOTAL Budget salary: $174,890

Fringe Benefits: Fringe benefits are based on the Tribe's actual costs for FICA, Medicare, Unemployment and Workers Comp. In addition, an allocation per month is made for Health Insurance for a full-time equivalent. This equates to a total applicable fringe rate of 30%. The following reflects the budget calculation based on the 30% fringe rate. **Total Budget Fringe for three staff: $67,208 (staff 1=$ 37,440; staff 2 =15,600; staff 3= 14,168).**

Travel: Travel and attendance at the 3-day National Tribal Forum on Air Quality (based on travel to Phoenix, Arizona as location stand-in) for the Air Quality Project Manager. The Portland, Oregon International Airport (PDX) is nearly a 4-hour drive time from Coos Bay, and includes an extra travel day to account for this burden.

- Conference Mileage: Car travel from Coos Bay to the Portland Airport (round trip 468 miles) with the GSA mileage rate of $0.585/mile: $274

- Parking: Long-term parking lot at the Portland Airport for 4 days. For purposes of budgeting the current published rate of $24/day for long-term parking was utilized: $96/trip.
- Airfare: Roundtrip from the Portland Airport to Phoenix, Arizona had a published rate on March 23, 2022 from Airlines for a 1-stop, mid-week flight $796 with one bag of checked luggage ($30/bag) with a total of $826/person was utilized: $826
- Lodging (Phoenix): The staff person will stay four nights in Phoenix, Arizona. Utilizing the published GSA rate of $151/night: $604
- Lodging (Portland): One staff will stay one night in Portland prior to driving back to Coos Bay. Utilizing the published GSA rate of $192/night: $192
- Per Diem (Standard): One staff member will have 4 days of standard per-diem at the GSA published rate for Phoenix, Arizona of $69/day: $276
- Per Diem (Travel Days): Each staff member will have two travel days, where the reduced per-diem rate of $55.50/day (GSA rate for Portland) will be paid. $111
- Project Mileage: Local travel for installation of instrumentation and other project activities in the Coos Bay, Florence, and Eugene. 5703 miles at GSA rate of $0.585/mile: $3,336.

Travel: Combined, this produces a budget estimate of $6,000.

Equipment:

Server: An additional sever and security/processing upgrades will be required to manage the data for this project: $3,380; PurpleAir sensors: 90 PA-II ($249/unit) and 75 PA-I ($199/unit) will be used for ambient and household installations (this includes 5 back up units): $40,570; Solar panel kits: 5 ($100/unit) for powering remote PurpleAir units: $500; Mobile Wifi: Netgear 4G LTE Mobile Broadband Modem (LM1200) $110.00/each for remote PurpleAir installations ($550); Air Purifies: 75 Levoit Smart Air Purifiers (PM2.5 activated) ($200/unit) will be provided to participating Tribal homes. $15,000.

Total Budget for equipment $ 60,000

Supplies:

We have budgeted $2,000 for citing supplies such as zip ties, hardware, supports (poles, brackets, cabling, etc.); Citizen Science Outdoor PA (75 for $18,675); Citizen Science Indoor PA (75 for $14,925); cloud services @ 1,200; office supplies, outreach and education materials and postage ($3,410)

Total Budget for supplies is: $40,210

Contractual: The project includes contracting with an air monitoring company to support the work products for this project. Specifically, the contractors will provide support in certain aspects of this project including: protocols and training services for instrumentation installation and data processing algorithms, conceptualization of data dashboard, and troubleshooting/technical support. Also, the costs of services the project includes contracted services from the Tribe's legal team to assist in drafting appropriate ordinances retained by the Tribe for similar projects.

Total Budget for Contractual: $40,000

Indirect Charges: A copy of the Tribes' Indirect Cost Negotiation Agreement has been included in this grant application. The agreement shows a stated rate of 30 percent that applies to all items

except equipment and contractor's fees in excess of $25,000 per year. For purposes of this project, the following indirect charges have been included: **$111,692**

Budget Table

Line Item & Itemized Cost	EPA Funding**
Personnel	
(1) Air Monitoring Project Manager @ $30/hr 2080 hrs/yr with a total of 4160 hrs of staff time for 2 years	$124,800
(1) Project Staff @ $25/hr.	$31,200
(1)) Project Staff @ $22.7/hr.	$18,890
TOTAL PERSONNEL	$174,890
Fringe Benefits	
30% Fringe benefits are based on the Tribe's actual costs for FICA, Medicare, Unemployment and Workers Comp. Health Insurance, Retirement, Health Benefits	$67,208
TOTAL FRINGE BENEFITS	$67,208
Travel	
Mileage for PM: (Coos Bay –Florence-Eugene) – 5703 miles	$3,279
Air quality conference	$2,721
TOTAL TRAVEL	**$6,000**
Equipment	
Server: An additional sever and security/processing upgrades will be required to manage the data for this project: $3,380; PurpleAir sensors: 90 PA-II ($249/unit) and 75 PA-I ($199/unit) will be used for ambient and household installations (this includes 5 back up units): $40,570; Solar panel kits: 5 ($100/unit) for powering remote PurpleAir units: $500; Mobile Wifi: Netgear 4G LTE Mobile Broadband Modem (LM1200) $110.00/each for remote PurpleAir installations ($550); Air Purifies: 75 Levoit Smart Air Purifiers (PM2.5 activated) ($200/unit) will be provided to participating Tribal homes. $15,000	$60,000
TOTAL EQUIPMENT	$60,000
Supplies	
Citing supplies such as zip ties, hardware, supports (poles, brackets, cabling, etc.)	$40,210
TOTAL SUPPLIES	$40,210

Contractual	
Support Services Contract	$40,000
TOTAL CONTRACTUAL	$40,000
Indirect Charges	
Federal Negotiated Indirect Cost Rate = 30%)	$111,692
TOTAL INDIRECT	$111,692
TOTAL FUNDING	**$500,000**
TOTAL PROJECT COST	**$500,000**

Expenditure of Awarded Funds: CTCLUSI has several mature and successful grant programs with a proven track record of promptly and effectively using funds.

i. Appendix 1: References

[ADDIN ZOTERO_BIBL {"uncited":[],"omitted":[],"custom":[]} CSL_BIBLIOGRAPHY]

RESUME

Mark Petrie
296 N 14th Street
Coos Bay OR, 97420
Ex. 6 Personal Privacy (PP)

WORK EXPERIENCE:

2019-2021 — Tribal Council Vice-Chair of the Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians (CTCLUSI)

- Run Tribal Government and Tribal Enterprises
- Engage with local, State, National and Tribal Governments and Entities
- Represent and protect CTCLUSI interests and endeavors

2013-present — CTCLUSI Volunteer Peacegiver for the Tribal Court

- Tribal Restorative Justice process implementation within Tribal Community

2016-2019,2021-present — CTCLUSI Tobacco Prevention Grant Coordinator

- Program Plan development and implementation
- Budget development and implementation
- Community Engagement and Outreach

2011-2019 — CTCLUSI Cultural Assistant

- Community event and activity organization and implementation
- CTCLUSI Specific curriculum development and implementation
- Maintenance of special equipment and cultural items and canoes
- Traditional language programming support and instruction
- Traditional First Foods cook and presenter

2008-2011 — CTCLUSI Tribal Tutor & Summer School Teacher's Assistant

- Scheduling tribal student tutor sessions
- Educational instruction and culturally relevant lesson implementation

Summers 2006-2010 — CTCLUSI Camp Counselor

- Cultural event and activity implementation
- Youth supervision and mentorship
- Shuttling

EDUCATION:

2008-2011 — Southwestern Oregon Community College

- Anthropology, Business
- Graduated with a Transfer Degree

March 17, 2022

Tribal Air Monitoring Support Center
NAU Institute for Tribal Environmental Professionals
4220 S Maryland Pkwy, Bldg D
Las Vegas, NV 89119

Dear EPA Enhanced Air Quality Monitoring team,

The Tribal Air Monitoring Support (TAMS) Center is pleased to offer this letter of support for the air quality monitoring expansion project proposed by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) as part of the EPA's American Rescue Plan (ARP) Act Air Monitoring grant for Enhanced Air Quality Monitoring for Communities.

Wildfires of both increasing frequency and increasing footprint pose a significant threat to community health here in Oregon. Not only is there immediate impact to communities who are displaced when fire ravages their homes, but impacts from the presence of smoke in the air can reach other communities hundreds of miles away. Research shows that increased exposure to particulate matter from wildfire smoke poses extreme health risks to communities, particularly in children, seniors, and those with compromised respiratory systems. Additionally, air pollution is linked with more severe COVID-19 cases and increases susceptibility to respiratory infection.

The Tribe has shared their plans with the TAMS Center to expand their existing air monitoring network using affordable particulate air monitors powered by solar energy. This ambient particulate monitoring data will be made available for free online in real-time. Having access to real-time information on air quality is critically important for communities to be able to protect themselves and neighbors from the harmful effects of particulate matter in the air. Toxins and fine particles can enter homes, therefore it is also critically important to make air purifiers and other mitigation measures accessible to vulnerable populations when particulate matter reaches dangerous levels.

CTCLUSI has worked with the ITEP and the TAMS Center in the past through taking ITEP courses and receiving Professional Assistance through the TAMS Center. ITEP and the TAMS Center can offer assistance with the technical aspects (equipment setup and operation, data management and reporting, etc…) to the education and outreach component for CTCLUSI's air monitoring project.

The TAMS Center recognizes this investment in CTCLUSI and the information it will provide the people of Coos County. The Tribal Program will ensure the right people get access to information and resources to keep themselves and their families safe during periods of poor air quality. For these reasons, we support CTCLUSI's application and hope that you will, too.

Respectfully,

Chris Lee

Christopher Lee
ITEP-TAMS Center Codirector
(702) 784-8278

TENMILE LAKES' BASIN PARTNERSHIP
P.O. BOX 548*LAKESIDE, OR 97449 * 541.260.0914
tenmilewatershed.com

March 14, 2022

Dear EPA Enhanced Air Quality Monitoring team,

As the Tenmile Lakes Basin Partnership's Watershed Coordinator, I am pleased to submit this letter of support for the air quality monitoring expansion project proposed by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) as part of the EPA's American Rescue Plan (ARP) Act Air Monitoring grant for Enhanced Air Quality Monitoring for Communities.

The Tribe proposes, with TLBP's strong support, to expand their existing air monitoring network using affordable particulate air monitors powered by solar energy. This ambient particulate monitoring data will be made available for free online in real-time. Having access to real-time information on air quality is critically important for communities like Lakeside Oregon to be able to protect themselves and neighbors from the harmful effects of particulate matter in the air. This threat became real for three days on the Southern Oregon Coast during the fires of 2020. During this period, toxins and fine particles entered businesses and homes, significantly impacting our daily activities. Therefore, it makes this proposal critically important for all Coos County residents and specifically to our older vulnerable populations when particulate matter reaches dangerous levels.

The true benefit of making this investment in CTCLUSI is their connection to the people of Coos County. The CTCLUSI have strong relationships and the public trust to undertake this important project. CTCLUSI through these partnerships will make sure the right people get access to information and resources to keep themselves and their families safe during periods of poor air quality. This is cost effective monitoring project that the CTCLUSI can implement with EPA support, that will provide real benefits to our South Coast communities.

For these reasons, I am pleased to support the CTCLUSI's application with this letter and any in-kind donations that TLBP can provide to this important project and hope that the EPA Air Monitoring Team will, too. If you have any questions regarding this letter or our support for CTCLUSI's proposal, please feel free to contact me at any time.

Respectfully,

Michael K Mader

Michael Mader
Watershed Coordinator
Tenmile Lakes Basin Partnership

Manifest for Grant Application # GRANT13580022

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 30665 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16020 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24276 bytes)

3. Form SF424A-V1.0.pdf (size 22853 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22760 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15907 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37252 bytes)

Attachments Included in Zip File (total 15):

1. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-LRAPA ARP Letter of Support (002).pdf application/pdf (size 118736 bytes)

2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-CTCLUSI Support Letter_EPA Wiliamete Partnership.pdf application/pdf (size 138798 bytes)

3. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1239-Dr. Roselynn Lwenya Resume March 2022.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 28845 bytes)

4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1238-TLBP EPA Air Monitoring Support ltr 3-14-2022.pdf application/pdf (size 24098 bytes)

5. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1248-Air Protection Specialist_Ali.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 20324 bytes)

6. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1245-Resume_March 2022 _Eriq.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 24490 bytes)

7. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1244-RESUME_2022_Mark.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 15342 bytes)

8. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1247-Air Monitoring Project Manager.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 125549 bytes)

9. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-Quality Assurance Statement.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 17534 bytes)

10. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1241-CTCLUSI Air Monitoring Grant DEQ Letter of Support.pdf application/pdf (size 158186 bytes)

11. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1240-2022-SupportLetter-CTCLUSI.pdf application/pdf (size 119938 bytes)

12. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1243-Letter of Support - CTCLUSI.pdf application/pdf (size 341096 bytes)

13. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1246-Resolution No 22-037 EPA Enhanced Air Quality Monitoring for Communities Grant.pdf application/pdf (size 144984 bytes)

14. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1242-CTCLUSI EPA LETTER 3.23.22.docx (1).pdf application/pdf (size 168471 bytes)

15. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1234-CTCLUSI ARP Grant Project Narrative.docx application/vnd.openxmlformats-officedocument.wordprocessingml.document (size 165424 bytes)